REVITALIZATION THROUGH REGIONAL RESILIENCE

The State of New Jersey

National Disaster Resilience Competition

Phase 2 Draft Application for Public Comment

September 25, 2015

Contents

EXHIBIT A: EXECUTIVE SUMMARY

New Jersey's application to HUD's National Disaster Resilience Competition (NDRC) mirrors the State's approach to Superstorm Sandy recovery. Decisions on how to invest limited resources must maximize benefits to affected New Jerseyans, balance diverse interests and achieve critical initiatives. To do that, the State has implemented a comprehensive recovery strategy. All affected sectors -- housing, economic, infrastructure, local government capacity, health and social services, and natural resources -- are being addressed simultaneously so one sector's recovery bolsters the recovery of the others.

The same approach holds true for the NDRC. While the primary focus identified in the State's Phase 1 NDRC application is to address flooding and storm surge, the foremost threat to numerous New Jersey estuarine communities and by extension inform other estuarine communities' planning for disaster events, that alone is not enough. The most effective resiliency project will address not just one threat, however significant. Rather, an investment must touch on all six sectors in the National Disaster Recovery Framework (NDRF) if it is to truly promote economic revitalization and community stabilization in the target areas. This was the State's approach in developing a Phase 2 NDR project.

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New Jersey is America's most urbanized state, with development concentrated along the nearly 1,800 miles of coastline and rivers. We are third in the nation in ratio of coastal to overall land area and ninth in revenue contribution to the national gross domestic product. The vibrancy of our coastal and riverine communities is vital to the economic, social and physical health of the State and the nation.

Although the mean elevation of the State is 250 feet above sea level, nearly all coastal counties and the "most-impacted and distressed" (MID) areas as identified by HUD after Superstorm Sandy are at sea level. As a result, estuarine areas experience frequent, repetitive significant flooding and storm

surge from hurricanes, tropical storms, and nor'easters. In addition, riverine communities are vulnerable to repeated flooding from significant rainfall events. Although Sandy was the most recent of major flooding/storm surge events in New Jersey, and was unprecedented in its scale of damage, New Jersey has a long history with such events. Hurricanes Irene and Floyd, and the 2010 nor'easter are three other examples among many flooding events that have damaged or destroyed homes, businesses, communities and infrastructure. Additionally, as a major industrial and manufacturing hub for the country and with 112 superfund sites, the ecological impact of repeated flooding on water and soil is considerable.

Because of development density and the inter-connectedness of our communities and ecosystem, effects of flooding and storm surge are felt in wide geographic areas covering millions of people, tens of thousands of businesses, critical infrastructure and natural resources. Costs of addressing damage, of insurance, and of mitigating future impacts are substantial. It therefore is critical to create replicable resilience models to protect regions while also catalyzing community stabilization and economic revitalization in order to maximize the impact of resilience investments.

To achieve this goal, New Jersey proposes a new way of thinking about flood prevention in estuarine and riverine, repetitive flood communities – ***Revitalization through Regional Resilience***. Areas across New Jersey that face repetitive flooding challenges could benefit from investment through HUD's NDR funds. Given the breadth of this unmet need, selecting a location as the focus of New Jersey's Phase 2 proposal was challenging. Ultimately, New Jersey has selected the first phase of this process to be in a pilot area in the Meadowlands Region of Bergen County. This region was selected primarily because: (i) the region includes significant Low and Moderate Income (LMI) and vulnerable populations (e.g., elderly; single parent households; adults, children and youth who are homeless or at risk of homelessness; people with disabilities or behavioral health needs); (ii) the proposed project addresses all NDRF sectors and is consistent with the State's comprehensive strategy

for promoting community stabilization and economic revitalization; (iii) the flood risks faced in the area are similar to the risks faced in other estuarine communities in New Jersey so lessons learned can be incorporated; and (iv) there are no U.S. Army Corps of Engineers (USACE) flood projection projects currently proposed that focus on the Meadowlands region, unlike other areas of the State.

Bergen County was identified by HUD as a most-impacted and distressed (MID) area after Sandy. This target area contains more than 12,900 housing units, 6,500 businesses, critical infrastructure such as the Teterboro Airport and Bergen County Utilities Authority, and sensitive environmental or superfund areas including Berry's Creek. While the proposed project builds on and expands the area currently under development through one of two Rebuild by Design (RBD) projects in New Jersey, it is important to recognize that this Phase 2 project is far more than the completion/expansion of the RBD flood protection berm. In addition to protecting adjacent communities not captured by RBD, the NDR project builds in components to make the investment truly comprehensive by focusing on all NDRF sectors and thereby will promote community stabilization and economic revitalization. The proposed NDR project contains three central components:

1. **Resilience Revitalization through Expansion of Berm; Pumping Stations; Wetlands Restoration and Water Control Structure(s).** The proposed project expands the proposed RBD berm from the edge of Hackensack at Route 80 down to the eastern border of East Rutherford, and along the southern border (Route 3) of East Rutherford, into Rutherford and also calls for pumping stations to address rainwater events as well as steps to begin addressing storm water management. Protection against flooding should increase property values and ultimately decrease insurance premiums, which will increase property equity and the disposable income of residents and businesses. In addition to protecting critical infrastructure, the project should also increase ratables which can lead to more community development investments,

which in turn raise property values thus creating a cycle of economic revitalization through resilience.

In addition, along with creating parks and bike trails as well as wetlands restoration, a water control structure is proposed at the mouth of Berry's Creek along the southern border of East Rutherford. The ability to manipulate water levels has the potential to enhance ongoing environmental remediation efforts and, in time, facilitate the replacement of invasive phragmites with native plant species including spartina, which in addition to providing a better environment for native species has been shown to open the possibility to biological remedial options for Berry's Creek (NDRC Request: $236 million)

2. **NJ TRANSIT Satellite Bus Garage.** Community stabilization and economic revitalization is tied to access to employment opportunities. Building a satellite bus garage in the Meadowlands Service Area to address economic impacts from Sandy in the target communities and on NJ TRANSIT assets will expand service to critical job centers like New York City, Jersey City, Newark and the estimated 8,000 jobs that will be created by the American Dream shopping center and entertainment project in East Rutherford. More public transportation also will reduce congestion, one of the area's most significant economic challenges, and will provide health and environmental benefits by reducing vehicle emissions. Improving and expanding public transportation and reducing congestion was supported by constituents as an important need. (NDR Request: $75 million)
3. **Planning.** The State will work with university partners to develop a toolkit of best practices developed during this project that can be incorporated by other communities facing similar flooding issues. (NDR Request $5 million). The last component seeks planning funds for those communities to facilitate a regional planning initiative. (NDR Request: $10 million)

The following map shows the project components. As discussed below, project components -- listed above in order of priority -- are largely severable, and within the Meadowlands Resilience Revitalization Project, the berm is severable from the wetlands/water control structure elements. Maximum benefit, however, will only be achieved through full implementation. Through this investment, the State's goal is to: (i) ***reconnect*** families and communities with estuaries and rivers by turning a liability into an asset, by protecting areas of frequent flooding and creating greenways and recreational enhancements such as walking and bike trails; (ii) ***reenergize*** the economy of targeted communities harmed by repeated flooding by improving transportation linking residents to jobs and spurring economic development; (iii) ***restore*** the natural ecosystem and begin to address long standing environmental contamination; (iv) ***reimagine*** how communities address flooding by fostering the creation of new plans, codes and ordinances; and (v) prove the efficacy of ***revitalization through regional resilience***.

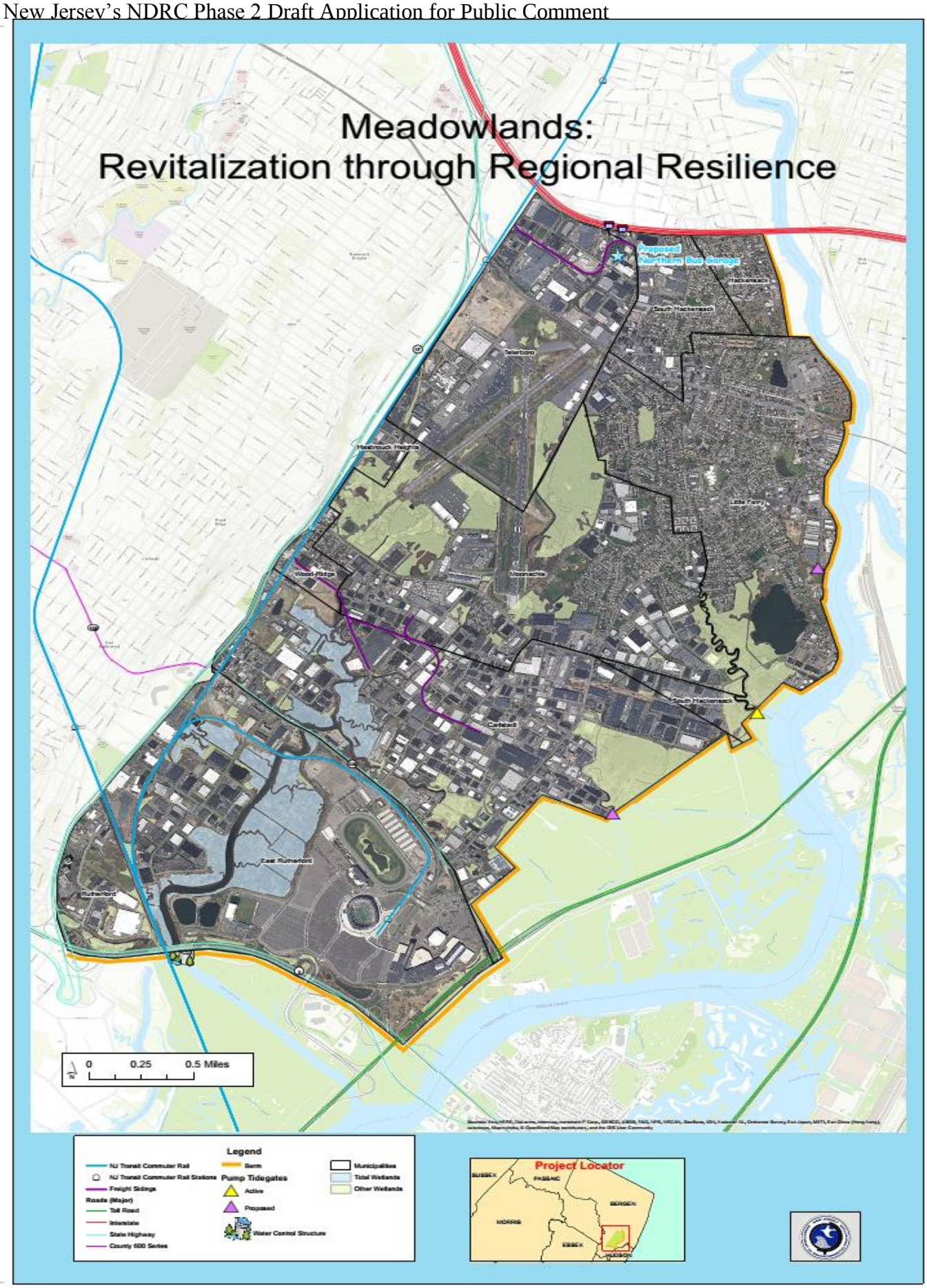

Meadowlands:
Revitalization through Regional Resilience
Proposed Northern Bus Garage
Hackensack
South Hackensack
Teterboro
Hasbrouck Heights
Lodi Park
Wood-Ridge
Moonachie
Carlstadt
East Rutherford
Rutherford
0
0.25
0.5 Miles
Legend
NJ Transit Commuter Rail
NJ Transit Commuter Rail Stations
Freight Sidings
Roads (Major)
Toll Road
Interstate
State Highway
County 600 Series
Berm
Pump Tidegates
Active
Proposed
Water Control Structure
Municipalities
Tidal Wetlands
Other Wetlands
Project Locator
SUSSEX
PASSAIC
BERGEN
MORRIS
ESSEX
HUDSON

EXHIBIT B: THRESHOLD

New Jersey is proposing a project that will result in ***Revitalization through Regional Resilience*** In the target areas, the project will promote community stabilization and economic revitalization through a combination of layered flood risk reduction measures to protect homes, businesses and infrastructure, and expand public transportation services to further stimulate the local economy, reduce emissions, and protect natural resources. The project also will support development and application of successful models and best practices that can be implemented by estuarine communities throughout the State and nation.

Unmet Local Share Need: The State of New Jersey was awarded CDBG-DR funds through the federal Sandy Supplemental legislation to address recovery needs, including local share obligations (or "match") for federal investments through FEMA Public Assistance, Federal Highway Administration (Federal Highway Administration) funds and Environmental Protection Agency (EPA) funds. The State has allocated $225 million dollars to its CDBG-DR Match Program. This is expected to cover approximately $76 million dollars for Federal Highway Administration match (specifically, the Route 35 Pavement Reconstruction and Drainage Improvement project) and approximately $48 million to match EPA funds to be distributed through the New Jersey State Revolving Fund. The remainder (approximately $101 million) is to be contributed toward the State's match obligations for FEMA Public Assistance.

Based on the FEMA Public Assistance Superstorm Sandy DR 4086, there is currently a total eligible Public Assistance project cost of $1,958,733,435, and a current match obligation exceeding $185 million. This far exceeds the current $101 million dollars available for the "match" for FEMA Public Assistance projects. Moreover, as mandated by the Voluntary Compliance Agreement signed May 30, 2014 by HUD, the State and certain advocacy groups, the State is obligated to undertake

specific housing activities, leaving insufficient funds for state and local match obligations or infrastructure rebuilding costs, including in the MID county of Bergen and our target project area.

B.1 Eligible Applicant

The eligible applicant is the State of New Jersey which based on initial estimates sustained over $35 billion in damage and mitigation needs from Sandy, including more than $25 billion in infrastructure need. State agencies including the Departments of Community Affairs, Environmental Protection, Health and Human Services, as well as the Meadowlands Regional Commission and NJ TRANSIT make up the State's core NDR team. Current partners include the New Jersey Meadowlands Regional Commission and Rutgers University.

B.2 Eligible County

The primary site for the NDR projects is Bergen County, one of the nine counties HUD identified as most impacted and distressed after Sandy. In Bergen County, communities located in the Meadowlands along the Hackensack River suffered the majority of damage, with damage to homes, businesses and infrastructure resulting from flooding and storm surge. As a result of Superstorm Sandy, 1% of the homes in Bergen County sustained "severe" or "major" damage, with damage largely concentrated in communities along the Hackensack River in Little Ferry, Moonachie, and Hackensack. The homes with major or severe damage in Bergen County account for almost 5% of all major and severe damage across the State. The vast majority of housing damage occurred to owner-occupied homes. Apart from Sandy, Bergen County (and the target areas) is subject to severe repetitive flooding from the Hackensack River following significant rain events.

Additionally, major highways such as Route 17 and the New Jersey Turnpike, which lead to the George Washington Bridge entering New York, run through the target communities. Many residents rely on NJ TRANSIT facilities which service the Northern New Jersey/New York City/Philadelphia

Metro area. Superstorm Sandy caused a system-wide shut down of NJ TRANSIT and significantly damaged NJ TRANSIT assets, including assets that serve the target communities.

B.3 Description of Proposed Target Area

Within Bergen County, the project service area for the berm and bus garage components are the communities of Little Ferry and Moonachie portions of Carlstadt, Hackensack City and Hasbrouck Heights, portions of East Rutherford, Rutherford and Wood Ridge, South Hackensack and Teterboro. The flood protection system that will start at Route 80 near the Hackensack River and travel downstream (southerly) along the Hackensack River to Route 3 and then travels westerly along Route 3 for a distance of 1.8 miles up to approximately Route 17. See the map on page 7. The target areas for the Regional Resiliency Planning Grant Program will be available in all nine MID counties focusing primarily on LMI inland and riverine communities.

B.4 MID URN Data Summary – County Level

As stated in Exhibit B of the Phase 1 application, unmet need in the nine MID counties is nearly $42.6 million for FEMA Public Assistance Project Worksheets for water and wastewater facilities. For all the nine MID counties the updated total of unmet need for the FEMA Public Assistance Project Worksheets match required for all critical infrastructure projects is $90,300,756 with a total of 1,877 Project Worksheets.

Damage in Bergen County from Sandy was largely concentrated in communities along the Hackensack River such as Little Ferry, Moonachie, and Hackensack. Severe and widespread damage occurred where the economic base is more diverse, commuting patterns more challenging, and the population more dense as compared to shore communities. NJ TRANSIT services, upon which many LMI residents and seniors depend, were significantly disrupted post-storm.

During Superstorm Sandy, Bergen County experienced surges that registered approximately 4-5 feet above average high tide (NAV88). Little Ferry and Moonachie experienced significant flooding

due to the tidal surge which overtopped various berms and the edge of the Hackensack River. The massive volume of water was pushed inland from Newark Bay to the Hackensack River. There are a large number of critical facilities vulnerable to storm surge within NDR target areas, including pump stations, municipal buildings, fire departments, civic centers, drain stations, sewerage stations Teterboro airport and Bergen County Utilities Authority. Homes with major or severe damage in Bergen County account for almost 5 percent of all major and severe damage across the State. The FEMA-provided loss estimation data shows that Bergen County had 27 properties with severe repetitive loss and 144 flood insurance claims with a value of $4,518,894. Superstorm Sandy exposed the vulnerabilities facing many New Jersey municipalities regarding disaster preparedness and recovery demonstrating that this project is vital to the health of various communities at risk for flooding.

Bergen County's unmet need of over $7 million which is composed of 251 FEMA Project Worksheets with an eligible amount of over $71 million.

B.5 MID URN Data Summary- Resilience Revitalization and Transit Project Area

Sandy highlighted regional flood vulnerabilities when stormwater in the Hackensack River severely impacted Little Ferry, Moonachie and other low-lying towns along the river. There are 84 FEMA Public Assistance Project Worksheets for this area with an eligible amount of nearly $5.1 million and an unmet need of $512,492 for infrastructure projects in the berm project service areas.

Unmet needs in communities in the target areas for the Meadowlands Resilience Revitalization Project and transit components are described below:

Little Ferry: is located on the Hackensack River and is susceptible to fluvial flooding from the river during rainfall events. During Sandy, homes, businesses and infrastructure in the community were severely impacted. In one Census Block alone, more than 1,000 households (54% of households in the tract) sustained at least "major" damage. The primary method of flood prevention and mitigation is

focused on pumping water out of the municipality land and waterways into the Hackensack River. Sandy also resulted in critical infrastructure failures including power loss and natural gas service interruption. The community must improve infrastructure resilience to militate against future loss.

Moonachie: is surrounded by a number of streams and at sits a lower elevation than neighboring municipalities. Moonachie experiences flooding whenever it experiences 3 to 4 inches of precipitation fall within a 24 hour period which occurs, on average, every two years. The town also faces significant challenges from storm water runoff; three pumping stations move the storm water from collection locations to nearby streams. During Sandy, all three pumping stations failed resulting in significant damage in the town. In one Moonachie Census Tract, over 600 homes (62% of the tract) sustained at least "major" damage.

East Rutherford: has a residential population of less than 10,000, but is home to a large commercial base and is traversed by critical commuter and evacuation arteries (Route 17, Route 120, Route 3, and NJ Turnpike). A NJ TRANSIT bus line and NJ TRANSIT Commuter Rail also pass through East Rutherford. The community also houses the Meadowlands Sports Complex, which is a significant job center, as well as the American Dream shopping center and entertainment project, which when completed will bring thousands of jobs to the region. Protecting this infrastructure and economic center from severe weather events is of critical importance to the economy of the region, as is protecting homes, nearly 30 of which sustained at least "major" damage from Superstorm Sandy. Airport takes up most of the borough -- the borough's residential population is less than 100 and is a critical transportation facility in need of protection from severe weather events. During Sandy, Moonachie Avenue and Industrial Avenue, streets adjacent to the airport, flooded. During periods of heavy rainfall, flooded areas at the airport are pumped downstream through low capacity ditches and streams. This creates contaminated soil harmful to the adjacent communities.

South Hackensack: had 24 homes sustain damage during Sandy. Power loss resulting from flood waters and storm surge also created significant challenges, including knocking out traffic signals on U.S. Route 46, which leads to access roads to major highways to New York City. Notably, there are 60 properties in South Hackensack with NFIP flood insurance policies and, as of 2013, 58 claims had been filed totaling $1,696,053, illustrating the costs of repetitive flood loss.

Carlstadt: borders East Rutherford, Moonachie, and South Hackensack. During Sandy, the highest confirmed water mark at the River Barge Park in Carlstadt was 8.6 feet. There were three tidal cycles that lasted about 7 hours. The municipality lost power, disrupting traffic on parts of Route 17.

Hackensack, Hasbrouck Heights, Rutherford, and Wood-Ridge: Areas across these municipalities sustained significant impacts from Superstorm Sandy. In Hackensack, for example, nearly 100 homes sustained at least "major" damage form the storm. The primary unmet need of these areas, however, is enhanced public transportation services to job centers like New York City, Jersey City and Newark.

All of these communities suffer repetitive flooding. According to the August 29, 2014 FEMA Flood Insurance Study (FIS) for Bergen County, the Meadowlands area is the most frequently flooded area in Bergen County, impacted annually by nor'easters. FIS also determined that communities in the target area are among the most likely to be severely impacted by coastal flooding from a 100-year storm: Moonachie, 98%; Teterboro, 96%; Little Ferry, 87%; Carlstadt, 77%; East Rutherford, 61%; and South Hackensack 50%.

B.6 MID Data Summary - Planning Program

Considerable Sandy recovery resources have been invested to improve planning for future severe weather events in communities across New Jersey. The most common beneficiaries have been oceanfront and bayfront communities where Sandy damage was generally more concentrated and severe. For example, demand for the New Jersey Department of Community Affairs (DCA) Post-Sandy Planning Grant Assistance Program which was open to all Sandy-impacted municipalities,

mostly came from hard hit oceanfront and bayfront communities in Ocean, Monmouth and Atlantic Counties, though a number of inland communities, including Little Ferry, also received funds. Consequently, there is a remaining need for planning resources for inland communities dealing with riverine flooding. The planning grant program will seek to provide technical assistance and flood mapping to assist communities in adapting Resilience Adaptation Action Plans that include mitigating against future events. The planning grant program will follow the structure provided by the Disaster Relief Appropriations Act for Coastal Resilience Networks funded by the National Oceanic and Atmospheric Administration (NOAA). Currently, this resource is only available to coastal communities, leaving an unmet need in over 115 communities located in the nine most impacted and distressed counties that experience inland flooding. In addition, an existing Planning Toolkit will be expanded and enhanced to incorporate the best practices from development and implementation of the Meadowlands Resilience Revitalization Project, and incorporation of tools and guidance appropriate to inland communities. The developed toolkit will assist those communities in developing resiliency programs and be distributed to the wider regional estuary and riverine communities

B.7 Eligible Activities

Meadowlands Resilience Project and the ***NJ TRANSIT satellite bus garage*** components are eligible CDBG-DR activities pursuant to Public Facilities Section 105(a)(2); ***Acquisition*** Section 105(a)(1); Relocation Section 105(a)(11). ***Transit Facility:*** Public Facilities Section 105(a)(2); ***Acquisition*** Section 105(a) (1); Relocation Section 105(a)(11); Capacity Building Section 105(a)(16). The planning program is an eligible activity under the *Planning Section* 105(a)(12); *Technical Assistance Section* 105(a) (19) and the ***toolkit*** and administrative are eligible activities pursuant to the Program Administration Section 105(a)(13); Planning Section 105(a)(12); Capacity Building Section 105(a)(16).

B.8 Resilience Incorporated

New Jersey's concept of ***Revitalization through Regional Resilience*** reconsiders how resilience investments can result in community stabilization and economic revitalization. Layering flood risk protection measures -- including the protective berm, pumping stations, wetlands, water control structures, etc. -- will certainly protect the target communities from storm surge and rainfall events, making them (and their critical infrastructure) more resilient. But layered flood protection will accomplish even more: they should lead to increased property values and decreased flood insurance premiums, through revised flood mapping, providing more disposable income to households and businesses, including the significant Low and Moderate Income and vulnerable populations. That increased investment also should be coupled with an increase in ratables, potentially allowing for reinvestment in other community improvement projects such as parks and bikeways which are incorporated into the proposed NDR project to facilitate such reinvestment. These community improvements should further increase property values, and create additional ecotourism opportunities, creating a cycle of revitalization.

The cycle is likely to continue if the target areas become more attractive to current and potential future residents become more attractive to current and potential future residents. That requires access to jobs and environmental and community health improvements. The Meadowlands Region is an economic driver for Northern New Jersey, given it is in close proximity to New York City, Jersey City, Newark and other job centers. One of the most frequently identified unmet needs through the community outreach process was increased public transportation services to connect people to those job centers. The proposed NJ TRANSIT satellite bus garage in the Meadowlands Service Area, which can house larger buses (thus increasing ridership capacity) resulting in new service in the target areas. It will have the additional benefit of limiting traffic congestion, a major challenge in the area, and the environmental and health benefit of improving air quality by reducing emissions. Each will make the target areas more stable, economically vibrant, cleaner and resilient.

These investments will significantly benefit natural resources in the area. Reduction in flooding with decrease runoff of contaminants and may facilitate the cleanup at the Berry's Creek Superfund site. Additionally, investing in a water control structure at the mouth of the creek not only will protect against storm surge events, but also provides options which may facilitate the ongoing EPA clean-up efforts and could facilitate the replacement of invasive phragmites with spartina, which in addition to providing a better environment for native species also has been shown, under the right conditions to demethylate mercury found in sediment. Less mercury in local fish and bird populations would provide considerable health benefits for the region and enhancing its resilience.

Finally, planning grants (combined with the toolkit of best practices to be created from implementing the NDR project) will expand municipal opportunities to build resilient communities.

B.9 National Objective:

New Jersey anticipates it will meet the Low and Moderate Income area benefit national objective for its proposed Meadowlands Resiliency Revitalization Project and bus garage. Bergen County is an exception community whose upper quartile for 2015 is 39.57%. The area to be protected by the Meadowlands Resiliency Revitalization Project and serviced by the bus garage contains several municipalities with LMI populations Low and Moderate Income populations exceeding this threshold, including South Hackensack (48.07%), Moonachie (44.96%), Carlstadt (41.46%), and Little Ferry (42.85%). Within these communities there are pockets of significant poverty, such as parts of Little Ferry which are 70.34%. It is anticipated that the western border of the service area will be Route 17, which bisects several Census block groups. Without the bisected towns, Census data demonstrates that the service area is 41.78% LMI overall. Given the LMI information indicated above for other communities wholly within the service area, the State is confident that the proposed projects will meet the LMA criteria.

B.10 Overall Benefit

New Jersey estimates that more than 40% of its funds will benefit LMI persons. The upper quartile for Bergen County is 39.57%.

B.11 Tie Back

Meadowlands Resilience Revitalization Project: The berm, pumping stations and storm water management project components will address storm damage that occurred in the Meadowlands District when Sandy's storm surge caused water to breach tide gates, berms and levees severely impacting the region. The restoration of the wetlands will improve flood storage capacity and enhanced wildlife habitats will provide economic revitalization through recreational amenities.

Transit Satellite Bus Garage: As a result Superstorm Sandy, the NJ TRANSIT system which serves not only the Meadowlands District but also the entirety of the North Jersey/New York/Philadelphia area was interrupted causing economic challenges in the region and disrupting the mobility of residents without access to private means of transport. The NJ TRANSIT investment also will economically revitalize communities with homes and businesses severely affected by Superstorm Sandy.

Regional Resiliency Planning Grant Program: The proposed planning project ties back to Superstorm Sandy because the planning grant funds will be used within the nine MID counties identified by HUD to enhance their preparedness for future storm events. Most counties include communities that were impacted by Sandy and face estuarine or riverine flooding of a type similar to what the State proposes to address in the Meadowlands Region through the NDR.

B.12 BCA

The benefit-cost analysis was completed in accordance with Appendix H, and detailed in Attachment F. Several benefits were estimated using the FEMA benefit-cost analysis (BCA) toolkit. The largest benefit of the covered project is avoided residential and commercial damage followed by wetland ecosystem and avoided utility damages. The NDR project is eligible based on the BCA.

B13. Certifications

The Applicant Certifications meet the submission requirements in Section IV of the Notice of Federal Assistance for the National Disaster Resiliency Competition.

EXHIBIT C: CAPACITY

C.1 Past Experience of Applicant

The **State of New Jersey** is the applicant for the NDR award. New Jersey has proven experience in successfully managing Community Development Block Grant-Disaster Recovery (CDBG-DR) funds in connection with Sandy recovery, among others, as well as federal recovery resources provided by DOI, DOT, EPA, FEMA, HHS, NOAA, and others. The State's NDR team of state agencies and authorities includes the following with their identified roles: The **Department of Community Affairs** (DCA) will be the lead applicant for the NDR grant. DCA has been the grantee for $4.2 billion in CDBG-DR funds in connection with Sandy recovery, successfully administering programs addressing all impacted sectors. In addition to NDR financial management, reporting and monitoring, DCA will ensure that CDBG-DR, CDBG, HOME, and other similar programs are integrated with the NDR project. The **Department of Environmental Protection** (DEP) will be the implementing agency for the Meadowlands Resilience Revitalization Project component. DEP, specifically the Office of Engineering and Construction (OEC) and its post-Sandy Office of Flood Hazard Risk Reduction Measures (FHRRM), will be the implementing agency for the Meadowlands Resilience Project. OEC has extensive experience in the design, construction, and management of state and USACE flood and coastal storm management projects including the $260 million Green Brook fluvial flood control project in Somerset County, the $1billion plus reconstruction of the state's Atlantic coastal beach and dune system, the $24 million coastal dune reinforcement project in Mantoloking and Brick Township, and the $21.6 million Pompton Lakes floodgates on the Ramapo River. DEP is the state agency responsible for natural resource protection, open space acquisition, flood mitigation programs, land use permitting, and cleanup of hazardous waste sites. DEP is also well-versed in administering federal funds (more than $1 billion annually). It is a sub grantee of Sandy CDBG-DR funds, a recipient of FEMA HMGP funds, and is implementing the RBD projects among other recovery initiatives. DEP

also has considerable experience with NEPA and HUD requirements. The **New Jersey Meadowlands Regional Commission (NJMRC)** (combining the New Jersey Meadowlands Commission and the New Jersey Sports and Exposition Authority) will assist with permitting, data collection, wetlands restoration, and regional planning. NJMRC serves as the planning and zoning authority for the Hackensack Meadowlands District and also has a role in promoting regional economic growth and development. The NJMRC has preserved more than 3,500 acres of environmentally sensitive wetlands and conducted numerous scientific studies that have helped improve the water quality of the Hackensack River and bring about wildlife resurgence in the District. In addition the NJMRC maintains a GIS database of 100,000 properties both in and out of the District. As regulators of land use and zoning, NJMRC's professional planners and engineers are intimately familiar with the properties and developments within the Hackensack Meadowlands District. Within the District, the staff processes development applications, proposals for redevelopment, enforces zoning, conducts construction code plan review and enforcement, and administers rulemaking and rezoning.

The NJMRC staff has also undertaken significant projects in the areas of flood control, transportation, wetlands mitigation and renewable energy.

NJ TRANSIT will be the lead agency for the satellite bus garage project component, enhancing transportation availability and options throughout the service area, including to its significant Low and Moderate Income and vulnerable populations. NJ TRANSIT is the nation's largest statewide public transportation system, and the third largest transit system in the country with 165 rail stations, 62 light rail stations and more than 19,000 bus stops. NJ TRANSIT has considerable experience implementing projects with federal FTA funds. The **Department of Human Services (DHS)** will help to ensure that citizen groups, organizations serving vulnerable populations and neighborhood associations will be identified and involved in design and implementation of all NDR projects. DHS serves about 1.5 million New Jerseyans, or about one of every six state residents. DHS assists DHS assists seniors,

individuals and families with low incomes; people with mental illnesses, addictions, developmental disabilities, or late-onset disabilities; and people who are blind, visually impaired, deaf, hard of hearing, or deaf-blind. DHS works with a network of local human service providers in the District. **Rutgers University** will be a partner in the project and DEP is in discussion with Montclair State University as a partner to also assist with outcome measures. **Rutgers, New Jersey's flagship state university** will assist in the development of outcome measures and perform the outcome data collection and evaluation. Rutgers is home to the National Center for Public Performance, the Performance Measurement and Reporting Network, the Journal Public Performance and Management Review, and the New Jersey Databank, which compiles social and economic indicators on NJ communities.

C.1.1 Recent Experience/Project Examples

New Jersey has significant recent experience with the types of infrastructure, wetlands restoration, transportation, and planning programs being proposed in the NDR project, as discussed in the examples below:

Example 1: Dune Reconstruction. DEP partnered with Brick Township, Mantoloking, and Federal Highway Administration to restore 3.5 miles of dunes destroyed by Sandy. The project required coordination between local, state and federal agencies. DEP managed procurement for design and construction, obtained easements, and provided construction oversight. The $24 million project was completed in January 2015.

Example 2: Lincoln Park Marsh Restoration Project. This project was a joint venture between DEP, NOAA, USACE, Hudson County Parks, and USFWS. It involved environmental clean-up, landfill closures and wetland restoration of 42 acres within Lincoln Park in Jersey City. Funding was received from multiple sources. DEP secured funding, coordinated partner resources, procured contractors, supervised cleanup and completed all federal reporting requirements. The project utilized

ARRA, State, and Federal Natural Resources Damage funding, requiring quick launch and completion. The $13.5 million project won the Coastal America Partnership Award.

Example 3: Coastal Community Vulnerability Assessment and Mapping Protocol. This program includes community vulnerability assessments and planning support and is currently in use in 90 municipalities in varying detail. Vulnerability mapping (e.g. sea level rise), community assessments and planning support provide communities with specific planning policy and project development recommendations and implementation assistance.

Example 4: NJ TRANSIT. In connection with Sandy recovery, NJ TRANSIT is overseeing more than $1.7 billion of FTA grant funds for NJ TRANSIT projects, including repairing damaged assets, raising substations, adding new train storage, service and inspection facilities, and enhancing flood control strategies including an ongoing project to fill in Long Slip Canal in Hoboken. NJ TRANSIT also is the primary state agency implementing NJ TRANSIT GRID, a large, complex project that will be the nation's first civilianized use of micro grids to protect critical transportation arteries in the event of electrical grid failure.

C.1.2 General Administrative Capacity and Experience

Project Management: **DCA**, as the grantee for $4.2 billion in CDBG-DR Sandy funding, will be the applicant for NDRC. DCA is experienced in the management of HUD funding as the state grantee for CDBG and HOME funds. **DEP** will be the implementing agency for the regional resilience and planning grant project components based on its expertise and the capacity to oversee large scale complex projects that require project and permit coordination throughout DEP and with State, federal, local and multi-regional regulatory entities (such as the examples noted above). In the Sandy context alone, DEP has extensive experience working with federal funds and managing timelines and budgets for various, complex recovery programs including Buyouts, the Flood Hazard Risk Reduction and Resilience Grant Program, the Elevation Program and RBD. NJMRC designs, implements and

manages a number of ecotourism projects in the region. **NJ TRANSIT** is experienced in the design and implementation of transportation infrastructure projects and will be the implementing agency for the satellite bus garage project component.

Procurement: **DCA, DEP,** and **NJ TRANSIT** have extensive experience with both state and federal procurement. **DCA** oversees procurement for all aspects of the State's CDBG-DR grant; preparing cost reasonableness estimates; preparing RFQs and RFPs; reviewing responses and selecting qualified contractors. Current CDBG-DR contracts under management include those for information technology, technical support, and staff augmentation. **DEP** is experienced in the procurement of engineering, design and construction for large infrastructure and environmental remediation projects, including those listed above. Both DCA and DEP work with the **New Jersey Department of the Treasury** to ensure procurements comply with all applicable laws and regulations. **NJ TRANSIT** works closely with U. S. Department of Transportation in the management of transportation funding coming to New Jersey and by statute undertakes its own procurements.

Contract Management: **DEP** is the State Contract Manager for CDBG-DR funded Blue Acres Buyout ($100M), Flood Hazard Risk Reduction and Resilience Grant Program ($100M) and Rebuild by Design ($380M). This is in addition to DEP's experience implementing programs and projects with other recovery resources, including HMGP, EPA DOI and NOAA. **DCA** is currently successfully managing over $4.2 billion of CDBG-DR Sandy recovery funds, including $1.6 billion for housing recovery programs (RREM, Low and Moderate Income Homeowners, Landlord Rental Repair, Resettlement, etc.). HUD and the Office of the Inspector General have routinely audited DCA (as Grantee) and CDBG-DR subrecipients during Sandy recovery.

Financial Management: **DCA** has a finance division devoted exclusively to financial management of CDBG-DR funds. The members of the division staff are highly experienced on federal requirements, invoice review, allowable costs, DRGR accounting, budgeting and financial forecasting.

DCA also contracted for the development of the Sandy Integrated Recovery Operations and Management System (SIROMS) to facilitate review and processing of invoices from contractors and partners. The system has the capacity to generate expenditure and forecasting reports, and often has been touted by HUD. **DEP**'s Division of Budget and Financial Operations staff has extensive experience in budgeting, federal, funding accounting and auditing for a variety of federal programs including EPA, USACE and HUD. Since DEP has direct spending authority, this Division is responsible for all account reconciliation and expenditure reporting to DCA

Accountability, Quality Control/Quality Assurance, Monitoring, and Internal Audit: **DCA** has internal monitoring and quality assurance protocols in place for all of its CDBG-DR programs. The Office of Compliance and Monitoring monitors each Disaster Recovery program no less than annually. In addition, DCA provides technical assistance and required training to all those entities administering DR programs. DCA also has an Internal Auditor who audits all DCA programs. Two **DEP** programs were recently the subject of the State's A-133 audit and received high marks with no material weaknesses, deficiencies or concerns.

Rapid Program Design and Launch: **DCA** received a total of more than $4.2 billion in CDBG-DR funds. All Round 1 funds (received in 2013) have been expended and 78% of Round 2 funds (received in 2014) have been expended. All programs have HUD approved policies and procedures and process maps. Staff, therefore, has shown capacity to design and timely launch compliant programs. Also, as a recipient of ARRA funds, **DEP** was required to design, launch and complete complex infrastructure projects on short timelines. The Lincoln Park project described above -- awarded, designed and completed in less than 2 years -- is an example of DEP's prowess in rapid design and launch.

Determining, Tracking and Evaluating Project or Program Outcomes: **DCA** developed project dashboards to track its CDBG-DR programs. The SIROMS system feeds information that populates

the dashboard, enabling program managers and senior leadership to track the progress of grantees at various benchmarks throughout the implementation process.

C.1.3 Cross Disciplinary Technical Capacity and Experience

Risks, Impacts, Vulnerability Assessment: The NOFA requires NDR projects to account for climate change. DEP in cooperation with NOAA, the New Jersey Sea Grant Consortium, the Jacques Cousteau National Estuarine Research Reserve (JC NERR), Rutgers State University, Monmouth University, New Jersey Future, Stevens Institute of Technology, and Sustainable Jersey has developed tools and a planning protocol to evaluate risks, vulnerabilities and impacts of communities to coastal hazards. In particular these tools and planning protocols allow DEP to anticipate and react by integrating information on extreme weather events and sea level rise. The Coastal Community Vulnerability Assessment and Mapping Protocol (CCVAMP), was developed to identify a community's vulnerability to coastal hazards. The CCVAMP includes 1) Coastal Vulnerability Index (CVI), a geospatial composite overlay model depicting vulnerability to coastal hazards; and 2) Getting to Resilience (GTR) a non-regulatory tool to assist local decision-makers in the collaborative identification of planning, mitigation, and adaptation opportunities to reduce vulnerability to coastal storms, flooding, and sea level rise. GTR provides information on strategies to improve community resilience and to support other community planning tools (e.g., National Flood Insurance Program Community Ratings System), and 3) recommendations for land use planning and ecological projects that support community resiliency goals.

Management of Project Design: **DEP** has more than 30yearsexperience designing, implementing and operating and maintaining flood risk reduction projects, site remediation projects, landfill closures, wetlands creation and enhancement projects, and the creation of state and municipal parks, among other large-scale projects. DEP's staff of qualified engineers, scientists, environmental specialists and planners, review all contract related documents and oversee all work. **NJ TRANSIT** manages the

design and implementation of the State's rail, light rail, and bus infrastructure, which is the third largest transit system in the country.

Site, City and Regional Planning: **DEP** has an office of Coastal and Land Use Planning that works with county and municipal governments to design and implement the Coastal Management Plan. The office employs professional planners and other experts in the areas of citizen engagement, ocean planning, policy development and engineering. **NJMRC** is the zoning and planning agency for a 30.4-square-mile area along the Hackensack River covering parts of fourteen municipalities.

Flood Insurance and Floodplain Management: Since 2005, **NJMRC** has participated in FEMA's voluntary Community Rating System (CRS) program, which allows for reductions in NFIP flood insurance premiums community-wide. As a result of NJSEA's efforts, property owners, businesses and tenants located in Special Flood Hazard Areas within the Meadowlands District, are eligible for a 15% discounts on NFIP policy premiums. NJMRC has been recognized by FEMA for its actions in flood data maintenance, open space preservation, storm water management standards and drainage system maintenance. In 2005, the former New Jersey Meadowlands Commission (NJMC) (now part of the NJMRC) drafted the Hackensack Meadowlands Floodplain Management Plan to guide the Commission in adhering to FEMA standards to attain flood insurance discounts for property owners. The plan, developed in cooperation with municipalities, county governments and other stakeholders, prioritizes floodplain management initiatives and proposes mitigation strategies.

Insurance Industry Issues: **DEP's** Office of Engineering and Construction works with NFIP on the CRS. The DEP's Dam Safety program, State storm water management requirements, and the development of all hazard mitigation plans, are some of the State level efforts that provide CRS credits for all New Jersey municipalities. The anticipated additional reduction in premiums is targeted at 5%, enabling more homeowners to afford NFIP policies.

Green Infrastructure Planning and Implementation: **DEP's Office of** Coastal and Land Use Planning Management Program have developed a Living Shoreline Strategic Direction for developing living shorelines within the coastal zone and other State-specific ecologically-based hazard mitigation strategies and policies elsewhere.

Pre-Development Site Preparation: **DEP** oversees site preparation for all infrastructure projects it undertakes. Recent examples include the pre-development work done to prepare coastal areas for the Flood Hazard Mitigation Program. This involves securing easements and readying areas for dune replenishment, and post-demolition work done to convert sites to open space.

Leveraged/Mixed Financing: **DEP** is frequently involved in projects that include multiple funding sources. Examples include the Route 35 Steel Sheet Pile Dune Restoration Project (partners: DEP, Brick Township, Mantoloking, Federal Highway Administration), and the Lincoln Park Marsh Restoration (partners: DEP, NOAA, USACE). NJ TRANSIT likewise has experience with complex projects that include multiple federal and state funding sources.

Acquisition and Disposition of Real Estate: **DEP**'s Green Acres Program has been preserving land and open space throughout New Jersey for 54 years. Green Acres has preserved or provided funding to preserve over 680,000 acres of land. Green Acres has spent over $2.5 billion on land preservation and park and recreation development projects since its inception in 1961. The Blue Acres Program acquires flood-prone structures as a means to create open space and preserve floodplains. The program completed more than five hundred (500) buyouts in twenty-two (22) New Jersey municipalities, utilizing State Blue Acres funds and more than $210 million in federal funding.

Rehabilitation and Reconstruction of Housing, Commercial, Industrial & Other: **DCA** has extensive experience in rehabilitating and/or reconstructing residential, commercial and industrial structures. As one example, DCA is overseeing the $1.35 billion RREM program that will assist over 8,000 homeowners with repair or reconstruction of their primary residence. As the State's CDBG-DR

Grantee, DCA also has a key role in implementing economic, infrastructure and health and social service programs funded with CDBG-DR funds, working in conjunction with other state agencies.

Redevelopment of Property: Much of the work done by **DEP** involves redevelopment of property through development of infrastructure, cleanup of contaminated sites or support for projects in local municipalities. DEP staff work with subrecipients to ensure procurement is done correctly, that cross-cutting federal regulations are followed and that national objectives are achieved.

Remediation of Brownfields and Contaminated Sites and Ecological Restoration: **DEP's** Site Remediation Program (SRP) oversees the remediation of contaminated sites and the parties responsible for conducting remediation. DEP also uses public funds to procure contractors to clean up contaminated sites where a responsible party is unavailable, unwilling or unable to remediate. Since 2011, almost 20,000 sites have been remediated, 15,000 of which were unregulated storage tanks and 5,000 former contaminated industrial and commercial facilities. The Office of Natural Resource Restoration (ONRR) coordinates with responsible parties to ensure an appropriate restoration project is implemented to compensate the public for the loss and enjoyment of natural resources. The Meadowlands Environmental Research Institute (MERI) is now restoring marshlands in the project area, replacing phragmities with spartina and other higher value species to improve the environment.

Accessing Operating and Investment Capital: The Environmental Infrastructure Trust Fund (EIT), which is an in, but not of DEP, provides low-interest loans to borrowers to finance infrastructure improvements in their communities. Since their creation in 1986, EIT has provided more than $6.3 billion to local and county governments for various projects to benefit drinking and wastewater infrastructure. EIT recently announced a round of funding to improve Sandy-affected wastewater facilities. To promote redevelopment of urban areas, DEP initiated "Smart Growth Project" loans that provide loans at one-quarter of the market rate for projects that correct combined sewer overflows,

purchase open space or are in targeted urban areas. DEP and the EIT also provide low interest loans to purchase open space for the protection of critical water resources and drinking water aquifers.

Assessing Technical Feasibility and Value Engineering: **DEP** contracts for design and construction, working in conjunction with the New Jersey Department of the Treasury. As part of the design bid package, a feasibility study is required to be in compliance with NEPA requirements. This feasibility study examines all the practical alternatives in order to determine the best approach to the design and construction of the project based on cost effectiveness, timeliness and community acceptance. Value engineering is a part of the feasibility to maximize the cost effectiveness of the alternative chosen. Feasibility (including value engineering) studies, design work, and construction are integral parts of the implementation of NJ TRANSIT projects, though statutorily NJ TRANSIT has its own procurement authority and does not work through Treasury.

C.1.4 Community Engagement and Inclusiveness

Regional Collaboration: The Meadowlands Municipal Committee (MMC) is part of **NJMRC** and consists of the mayor of each of the 14 municipalities or a designated alternate. This body is charged with reviewing all proposed codes and standards, the District Master Plan and any amendments to the plan, development and redevelopment plans, improvement plans or other major decisions of the NJMRC. NJMRC's efforts have helped attract billions of dollars in new development to the area, and the NJMRC. NJMRC's has invested tens of millions more in infrastructure improvements that have benefited District municipalities, residents and businesses. Simultaneously, NJMRC has preserved more than 3,500 acres of environmentally sensitive wetlands and conducted numerous scientific studies that have helped improve the water quality of the Hackensack River and bring about wildlife resurgence in the District.

Cross-Disciplinary Collaboration: **DEP** has a long history of successful collaboration with federal agencies (USACE; EPA and many others) and local governments on flood control projects

(annual average $35 Million). DEP partners with localities on the design and funding of federal and state flood control projects. DEP engineering staff members work with local government planners and leaders to formalize local funding commitments and maintenance responsibilities. DEP has working relationships for the development of Statewide flood management strategies and projects with Stevens Institute of Technology, Stockton University's Coastal Research Center, Rutgers University School of Engineering, Montclair State University's Passaic River Institute, and NJ Institute of Technology's Flood Mitigation Center. **DCA**, a partner in the NDR process, is involved in cross-department and cross-disciplinary programs with the New Jersey Economic Development Authority (EDA), and the Department of Transportation (DOT). NJ TRANSIT has extensive experience implementing transit projects with various partners, notably FTA.

Community Engagement and Outreach: The broad, extensive outreach undertaken in connection with developing the NDR Phase 2 proposal exemplifies the State's commitment to outreach and engagement, and is described in more detail below. Going forward, **DEP** will continue its engagement and outreach efforts through public meetings and hearings, the Citizen Action Group (described below), and other engagement. **DHS** will use its network of local service providers to link hard-to-reach and vulnerable populations in the NDR project during all phases, including design and implementation.

The North Camden stakeholder process involving a brownfield redevelopment project and the creation of HUD funded supportive housing is one example of DEP's engagement on large projects. DEP worked with North Camden stakeholders on reuse of brownfields in the neighborhood following the North Camden Neighborhood Plan (2008). As a result, the North Camden stakeholder group is currently designing a riverfront park along the Delaware River as part of the reclamation plan. DEP received a $300,000 EPA Brownfields Job Training grant designed to train Camden residents to work on brownfield redevelopment.

NJ TRANSIT works with representatives of under-served and vulnerable populations to create and administer publicly funded transit programs for people with disabilities, senior citizens, and those living in more rural areas without access to transportation. Like DEP, NJ TRANSIT is committed to robust public engagement in project implementation through the process outlined below.

Project Coordination in Partnership with Other Implementing Stakeholders: **DEP** has a long history of working successfully with USACE, EPA, NJDOT, DCA, other local units of government and municipal authorities. DEP also communicates and collaborates with other states and federal entities. An example is participation with the Technical Coordination Team (TCT) for the Rebuild by Design projects. These meetings occur quarterly and include representatives of the various states in the Northeast where the RBD projects are located as well as representatives of the USACE, EPA and the Port Authority. **NJ TRANSIT** has an extensive history working successfully with federal and state agencies (e.g., FTA, EPA, and NJDOT) on large projects.

Consultation and Stakeholder Involvement: **DEP** representatives contacted over 150 local organizations to solicit input on all components of this application and in designing this application. Flyers describing the project were widely distributed in target communities. A community meeting was held where citizens participated in breakout sessions to discuss the project, ask questions and raise concerns. Outreach included utilizing services from two New Jersey-based organizations that specialize in outreach to vulnerable populations. A formal public hearing will be held before the project is submitted to HUD. More information is provided in Attachment D.

Working Productively with Other Organizations: **DEP**, **NJ TRANSIT** and **DCA** have staff members skilled at facilitation, meeting logistics, and support services necessary to enable meetings to be professionally managed and productively conducted. Meetings with other organizations, stakeholders, state and federal departments are a regular part of DEP's, NJ TRANSIT's and DCA's business process.

C.2. Management Structure

C.2.1 Existing Management Structure:

NDR project governance involves adoption of a project network with multiple partners focused on achieving project goals. This provides for flexibility in decision making while maximizing the talent, expertise and resources of each partner. This approach, described below, provides the flexibility needed to meet rigorous timelines. This project will be embedded in the long-term expectation of future activities among the partners. The structure represents a shift from the traditional hierarchical project management system towards an open system view of collaboration.

NDR Project Senior Leadership Team: This group, comprised of high level leadership from each of the partners will provide direction and guidance to the NDR Project Working Group and to the Task Groups under their direct purview. As shown below, all members of the group hold senior leadership positions within their respective organizations. Final decisions on project implementation will rest with DEP -- on the Meadowlands Resilience Revitalization and planning components and with NJ TRANSIT on the satellite bus garage as they are the state agencies charged with implementation.

NDR Project Working Group: This group is comprised of management level staff from each of the implementing partners and is responsible for coordination of project activities, outreach, community engagement, monitoring and reporting. These individuals all have responsibilities for direction of individual project teams in their organizations.

NDR Citizens Advisory Group: This group is made up of citizens representing the various populations that will potentially be impacted by the projects. It will have representatives of vulnerable populations, senior citizens, low income residents, and persons with disabilities. The group will also have representatives from each of the project teams and will have one or two representatives assigned to serve on the NDR Project Working Group, so that suggestions made by this group are effectively considered throughout project implementation.

NDR Project Teams: DCA Sandy Recovery Division (applicant): This team from the NJDCA will employ the programmatic, data and financial management infrastructure developed to effectively manage $4.2 billion in CDBG-DR funds in the fiscal and programmatic management of NDR project funds. The team will be led by Stacy Bonnaffons, Assistant Commissioner for SRD Partner Programs. Team members will include

- Vera Ricciardi, CFO of Sandy Recovery Division - MBA from NYU and 30 years in financial management in private sector and more recently public sector.
- Paul Regan, Controller for Sandy Recovery Division – Certified Public Accountant and a Chartered Global Management Account with mover 25 years' experience in accounting and finance positions in private industry. Graduated from University of Scranton, where he received a Bachelor of Science degree in Accounting.
- Michael Simon, Asst. Director for Compliance & Monitoring – Over 20 years' accounting experience and has been managing CDBG-DR compliance/monitoring for the past 2 years.
- Lisa Ryan, Communications Director – more than 15 years of experience in writing and communication, having worked as a senior staff writer for local and regional newspapers. Since June 2013, she has served as director of strategic communications and spokesperson for the DCA's Sandy Recovery Division.

Meadowlands Resilience Revitalization Project: This team of staff from the DEP's Office of Flood Hazard Reduction Measures at DEP is under the direction of David Rosenblatt, Manager, Rosenblatt has 37 years of experience at NJDOT and DEP in management positions. He is currently the Administrator of the Office of Engineering and Construction. Other team members are:

- Kerry Kirk Pflugh, Manager of Constituent Services – holds MS degree from University of Wisconsin in Agricultural Journalism. She will be responsible for managing all DEP's community engagement activities.

- Dave Bean, Environmental Specialist – over 26 years of experience in DEP. He managed remediation projects in the Site Remediation Program, and resource restoration projects in the Office of Natural Resource Restoration, and the Office of Flood Hazard Risk Reduction Measures.
- Linda Fisher, Environmental Specialist – Bean and Fisher will oversee the Meadowland Rebuild by Design Project. During her 23 tenure at DEP, Fisher held positions in the Site Remediation Program and served as a Supervisor in the Division of Land Use Regulation. She oversees the Meadowlands Rebuild by Design Project.
- Bob Marcolina, Environmental Specialist – BA in Environmental Science from SUNY and 27 years of experience in environmental assessment and remediation. He will oversee the implementation of the berm and wetlands restoration portions of the project.
- John Moyle, DEP's chief flood engineer, manager of the Bureau of Dam Safety and Flood Control, and the State's NFIP coordinator.
- William Dixon, manager of the Bureau of Coastal Engineering; which oversees all State and USACE shore protection projects.
- Joseph Ruggeri flood engineer specializing in modeling.

NJ TRANSIT Satellite Bus Garage: This team from NJ TRANSIT will be overseen by Eric Daleo. Eric is the Director of NJ TRANSIT's Superstorm Sandy Recovery and Resilience Program and previously served as a Special Advisor in the Governor's Office of Recovery and Rebuilding, focusing on transportation and other infrastructure projects. Team members will include:

- Jared Pilosio, Manager, NJ TRANSIT Superstorm Recovery and Resilience Program, assisting in program management, tracking and reporting. Previously served as a Policy Advisor at the Port Authority of New York and New Jersey, where as part of his duties he served as liaison to the State of New Jersey on Sandy Recovery matters.

Kenneth Rotter, Deputy General Manager - Former Director of Property Management at NJ Transit where he oversaw the acquisition, leasing and sale of NJ Transit property. He has been an attorney in New Jersey for more than 20 years.

Toolkit and Resiliency Planning Grant Program: This team from the Office of Coastal and Land Use Planning at DEP (OCLUP) administers the planning and enhancement of the Coastal Management Plan (CMP). OCLUP staff develops and implements long range planning projects, and coordinates with complementary programs and initiatives in the coastal area. This team will be under the direction of Elizabeth Semple, Manager. Ms. Semple led the development of the State's Stormwater Management Rules and all aspects of the OCLUP for the past 8 years. The team will include:

- Nicholas Angarone, Research Scientist – NJ licensed and nationally certified Professional Planner. Nick has led a team to develop and implement sustainability and resiliency programs for past 8 years and manages several federal planning grants.
- Richard Brown, Environmental Specialist – expertise in ecological science and NJ licensed Professional Planner. Mr. Brown will lead community outreach and field work.
- Steven Jacobus, Section Chief – Environmental engineer who leads development of nature-based resilience and ecological restoration projects for OCLUP.

C.2.2 References

New Jersey has an outstanding record of effective, compliant administration of federal grants. Our references from USACE and the Middlesex County Utilities Authority validate this history of DEP's experience and ability to manage large, complex construction projects. These references come from our Shore Protection Project in Mantoloking, New Jersey and our Environmental Infrastructure Project in Sayreville, New Jersey.

EXHIBIT D: NEED

D.1 Unmet Recovery Need (URN) and Target Geography

The State of New Jersey has averaged one federally declared disaster over each of the last 15 years, with nine of the events impacting all nine Sandy MID counties. Repeated repair costs and insurance premium increases pose significant challenges for households and businesses, with vulnerabilities to costs creating unique challenges for LMI households and vulnerable populations.

While numerous areas in New Jersey could benefit from NDR investment given flood risk across the State, the Meadowlands Region was selected as the target area because: (i) the region includes significant LMI and vulnerable populations; (ii) the proposed project addresses all NDRF sectors and is consistent with the State's goal of promoting community stabilization and economic revitalization through a comprehensive strategy; (iii) the flood risks faced in the area are similar to the risks faced in other estuarine communities so best practices can be incorporated; and (iv) unlike other areas of the State, there are currently no USACE flood management projects proposed for construction in the Meadowlands, although the USACE North Atlantic Coast Comprehensive Study has targeted the area for further feasibility analysis. Additionally, Sandy damage to critical facilities in the region – including wastewater treatment facilities and NJ TRANSIT assets -- caused significant service disruptions post-Sandy that created or magnified other challenges, especially for LMI and vulnerable populations. Protecting these assets will serve numerous communities following the next severe weather event.

D.1.1 Unmet Needs in MID Bergen County

Bergen County: is among the most challenged areas of the State when it comes to repetitive flood losses. Seven Bergen jurisdictions had more than 350 severe repetitive loss (SRL) properties. The county also contains significant LMI and vulnerable populations (e.g., elderly; adults, children and youth who are homeless or at risk of homelessness; people with disabilities or behavioral health

needs), including a sizeable manufactured housing population in Moonachie. After flood events, these groups face unique challenges including disrupted support networks, accessibility issues and increases in cost of living.

Sandy highlighted Bergen's vulnerability to inland riverine flooding and revealed how various infrastructure systems in the region are interdependent. The county's energy infrastructure was significantly damaged with end users experiencing prolonged outages, despite efforts to restore systems as soon as possible. Flooding of substations and other distribution components brought many operations to a standstill and caused a threat to public health and safety. Water and wastewater operations were significantly disrupted when those facilities were unable to operate pumping stations and other equipment. Failure of these systems compromised the quality and safety of the county's water supply.

Flooding and power loss caused significant damage to the region's transportation and public transit infrastructure. This was particularly acute in Bergen, a transportation hub for North Jersey, New York City, and Philadelphia, where NJ TRANSIT service was significantly disrupted. Local and state roadways experienced significant damage from flooding. Sandy also caused extensive damage to other types of infrastructure including, schools, parks, and public and community buildings.

D.1.2 Unmet Needs in Project Area – Meadowlands Resilience Revitalization Project

The Meadowlands Resilience Revitalization Project MID URN target geography includes Carlstadt, portions of East Rutherford, Hackensack and Hasbrouck Heights, Little Ferry, Moonachie, portions of Rutherford and Woodridge, South Hackensack and Teterboro. Most of the towns have properties located on the Hackensack River or tidal tributaries. (Attachment F provides a listing of the 18 census block groups that meets the MID threshold criteria within the Meadowlands District.) Nearly all of the target areas are at high-risk of flooding, and there are no science-driven scenarios that foresee future reductions in flood risk. Sea level rise and increases in precipitation are anticipated.

Projected increases in population mean the number of individuals in the region susceptible to the impact of severe weather events will grow, and will create development challenges and strain on resources.

As further proof of need in the area, according to the August 29, 2014 FEMA Flood Insurance Study (FIS) for Bergen County, the Meadowlands area is the most frequently flooded area in Bergen County, impacted annually by nor'easters. FIS determined that communities in the target area are among the most likely to be severely impacted by coastal flooding from a 100-year storm: Moonachie, 98%; Teterboro, 96%; Little Ferry, 87%; Carlstadt, 77%; East Rutherford, 61%; and South Hackensack 50%. Flood risks extend to homes, businesses and critical infrastructure as shown by the impacts from Sandy. Sandy severely affected the economy in the region as a result of power outages and impacts on critical facilities. Transit impacts revealed vulnerabilities of area jobs. For the region to be resilient, assets that connect people to job centers must be protected. For example, the American Dream shopping center and entertainment project in East Rutherford will bring thousands of jobs (an estimated 8,000 retail and service employment opportunities). This job center will not be resilient if the facility faces repetitive flood risk or if workers cannot reach the facility after severe weather events. The same is true for flood risk to MetLife Stadium and other job centers, and transportation routes serving them.

Repetitive flood risk at this level affects property values, insurance premiums, and decisions of residents in businesses of whether to invest in, or remain in, communities. It makes it harder to attract and retain businesses and the jobs they create which support housing development and increased tax bases, and all of which contribute to resilience. In short, repetitive flood risk makes communities less stable and attractive affecting people in a very real way. This is why the Meadowlands Resilience Revitalization Project is innovative. It does not just look at flood risk reduction, but rather seeks to create long-term stability by tying flood protection investment with other critical economic

revitalization investment (e.g., connecting populations, including LMI populations, to job centers like New York City, Newark, Jersey City and the American Dream complex by enhancing public transportation assets, routinely referenced by constituents during project outreach as a critical area need) and community health and natural resource protection investments. Community stability and vitality only will be achieved if community needs are addressed on all fronts, which is what this project seeks to do.

D.1.3 Unmet Needs in MID Counties – Planning Grant Program and Toolkit

The Planning Grant Program and Toolkit MID URN target geography is the nine (Atlantic, Bergen, Cape May, Essex, Hudson, Middlesex, Monmouth, Ocean, and Union) most impacted by Sandy. While DEP's existing "CCVAMP" planning program and toolkit has been well accepted and effective in assisting coastal communities, similar planning resources and tools have not been available to assist inland and riverine communities. NDR can serve that purpose.

Atlantic County and its municipalities experience several types of flooding and the area is highly susceptible to storm surges and urban drainage issues. **Cape May County** has the highest number of Repetitive Loss properties in the State (2,302 properties). Areas such as **Essex County** experienced inundations along the coast due to the storm tide during Sandy. According to the **Hudson County** Hazard Mitigation Plan, there have been a total of 383 properties with Repetitive Loss and Severe Repetitive Loss, and this area has the greatest number of critical facilities and infrastructure located in the flood hazard area. **Middlesex County** has experienced 47 floods over a period of 57 years, with damages of over $42 million. There are a total of 114 Severe Repetitive Loss properties located in 17 **Monmouth County** communities suffering losses totaling $23,727,939. Flooding in Monmouth County is attributed mainly to tropical storms, nor'easters, and severe thunderstorms. **Ocean County** has the highest percentage of land in the V-zone which is the most vulnerable portion of the Special Flood Hazard Area and 15.9 percent of their population is in a Special Flood Hazard Area. **Union**

County has a total of 728 Repetitive Loss properties that have received over $60 million in paid claims. The primary cause of flooding is a result of heavy rainfall. Again, while coastal and bayfront communities can benefit from existing DEP tools to plan for coastal flooding events, a number of communities are instead facing estuarine and riverine flooding, which presents unique challenges.

D.1.4 Needs in Addressed By NDR Projects

Meadowlands Resilience Revitalization Project: As described in detail above, repetitive flood losses and all of the attendant impacts are the foremost challenge in the target areas. But the area also faces other related hurdles to community stabilization and economic revitalization, including pollution from storm run-off and ongoing environmental clean-up at Berry's Creek. The multi-layered flood protection seeks to address these risks, and as an additional benefit should enhance property values, reduce insurance premiums and protect critical infrastructure in the target areas. The multi-purpose berm, which will incorporate public recreation space (parks, etc.) will wrap around the target areas to protect against storm surge and flooding. Wetlands will be enhanced and expanded, which also provides natural protection against flooding events and storm surge, while providing for recreation and enhancing the appearance of the landscape. Enhanced, created or restored wetlands and wetlands transition areas (buffers) also can improve the habitat for native biota. Finally, a water control structure at the mouth of Berry's Creek provides options that have the potential to enhance ongoing environmental remediation efforts and, in time, facilitate the replacement of invasive phragmites with spartina and other plant species, which in addition to providing a better environment for native species also has been shown under the right conditions to demethylate mercury found in sediment out of water. Less mercury in local fish and bird populations would provide considerable health benefits for the region and enhancing its resilience.

Investment in this component of the NDR project will achieve community stabilization and economic revitalization by simultaneously protecting the housing, business and infrastructure sectors,

enhancing local government capacity by increasing ratable bases, addressing public health needs and improving water quality and enhancing the habitat of native species (comprehensively addressing all six components of the National Disaster Recovery Framework). This stabilization and revitalization will then be significantly increased through the economic revitalization from the NJ TRANSIT project.

Finally, as part of implementing this project component, DEP will work with both Rutgers University and the Coastal and Land Use Planning Program to develop a toolkit of best practices through implementation of the NDR project. This will be useful to other inland communities facing similar riverine flooding challenges. The toolkit will provide data, analysis, procedures, and best management practices to assist New Jersey communities understand their vulnerabilities to hazards. The toolkit will seek to (i) develop an easily accessible and repeatable cost-benefit analysis process; (ii) provide additional research and modeling to project non-tidal flooding from hazards such as sea level rise and rainfall events; and (iii) incorporate all best practices by the Meadowlands Resilience Revitalization Project.

NJ TRANSIT Satellite Bus Garage: In response to constituent needs for enhancing public transportation for assets to better connect people in the area to job centers. Unlike the Oradell garage that was damaged in Hurricanes Floyd, Irene, and other storms, a new satellite bus garage would be built in the Meadowlands Service Area in a resilient manner. The garage also would be able to house larger buses, which would increase capacity for ridership on existing routes. In addition, locating the garage in the Meadowlands Service Area would increase the amount of service in the target areas, connecting people to job centers like New York City, Jersey City, Newark and the Meadowlands Arena area (MetLife Stadium and the American Dream complex). More public transportation also will reduce congestion, one of the area's most significant economic challenges, and will provide important additional health and environmental benefits by reducing vehicle emissions. In short, effective community stabilization and economic revitalization is tied directly to access to jobs; after all,

communities are not resilient if people cannot get to their place of employment after severe weather events. In concert with the flood risk protection investment, the NJ TRANSIT project will amplify economic opportunity and stability in the target areas.

Resiliency Planning Grant Program: A Resiliency Planning Grant Program will be created for the nine most MID counties to be used for flood control planning for inland communities and application of the Meadowlands lessons learned. The Meadowlands Resilience Revitalization Project components, along with integration of concepts in the existing *Getting to Resilience* Toolkit as modified for inland and riverine communities, can be used by other communities in New Jersey and across the country. The toolkit will incorporate geospatial inputs, including storm surge, flood prone areas, and drainage. With the above inputs, it will facilitate the requisite analysis of climate change and sea level rise to assist local planners and code officials to determine how they may create high hazard areas adjacent to rivers, thus informing local regulations and ordinances. The projected goal of these regional adaption action plans is to prepare communities for future NOAA funding rounds for capital projects.

D.1.5 Needs Addressed by Leverage

DEP will assume responsibility for operation and maintenance of the berm and any ancillary water control structures and/or pump stations. The value of investment is expected to be $520,000 per year, for a total of $26 million at current dollar value over the fifty-year life of the berm. As in the past, annual federal appropriations to the State for these types of projects will be the source of funding for operations and maintenance. Additionally, DEP will invest at least $250,000 of state funds to conduct a feasibility analysis of the replicability of a pilot project throughout estuarine communities within and outside MID counties.

NJ TRANSIT has committed to providing maintenance and upkeep of the new garage. The value of this investment is projected at $900,000 per year for the 40-year operational life of the garage (the typically used useful life of similar transit assets), for a total of $36 million.

Focusing only on direct investments does not illustrate the broader benefits this project will provide. For example, a key consideration in incorporating the NJ TRANSIT bus garage into the project is the $2.5 billion of combined private and public investment to realize the American Dream Project in East Rutherford. The proposed NJ TRANSIT bus garage investment has the potential to better connect target area populations to the approximately 8,000 employment opportunities associated with the project. Moreover, while as stated above the proposed NDR project is very different from Rebuild by Design (comprehensivecomprehensive strategy for the entire region as opposed to a pure flood protection project) this project clearly leverages the RBD funds in order to increase the benefits of this important project.

D.1.6 Project Target Area Qualification as MID URN

As described in more detail in the Threshold Section, there are 84 FEMA Public Assistance Project Worksheets with an eligible amount of nearly $5.1 million and an unmet need of $512,492 for infrastructure projects in the berm project service area. Moreover, Section B.5 sets forth in detail the target area qualifications as MID URN for each of the municipalities within the target area. To briefly summarize, nearly all of these municipalities border the Hackensack River or one of its tributaries and have faced, and continue to face, severe repetitive flooding challenges. Little Ferry and Moonachie sustained the most severe damage to residences and businesses from Sandy, but East Rutherford, Hackensack and other areas were also affected. All areas were affected by power outages and their effect on critical facilities and transportation assets.

D.1.7 BCA and Additional Benefits and Costs

The BCA is available at Attachment F. Where feasible, DEP collected quantitative and monetary estimates for expected impacts of the project. In some cases, where DEP was unable to identify sufficiently applicable or credible quantitative data relevant to the covered project or service area, quantitative assumptions and analyses were used (e.g., scaling factors) to estimate the impact on the proposed service area using estimates from nearby localities or recent quantitative studies on hazard mitigation. Some benefits were estimated using the FEMA benefit-cost analysis.

The largest cost of the project is the construction of the berm at $3.46 million per year. The next largest cost is administration and contingency costs for the construction of the berm at $2.64 million per year, followed by bus transit construction cost ($1.50 million per year), bus maintenance cost ($0.90 million per year), wetland construction ($0.58 million per year), recreation zone construction ($0.54 million per year), annual berm maintenance ($0.52 million per year), and land acquisition ($0.50 million per year). The largest benefit of the covered project is avoided residential and commercial damages at $63.87 million per year. The next largest benefit is recreational and health benefits at $7.12 million, followed by avoided American Dream Mall damages ($2.45 million per year), avoided utility damages ($0.86 million per year) and wetland ecosystem services ($0.78 million per year). Based on the BCA, this project is eligible for funding through the NDRC.

D.2 Resilience Needs within Recovery Needs

D.2.1 Actions to Limit Effects of the Qualified Disaster Event(s)

Areas across New Jersey facing repetitive flooding challenges will benefit from investment through HUD's NDR funds, and given the breadth of this unmet need selecting a location as the focus of New Jersey's Phase 2 proposal was challenging. Ultimately, New Jersey has selected the first phase of this process to be in a pilot area in the Meadowlands Region of Bergen County. This region was selected primarily because: (i) the region includes significant LMI and vulnerable populations; (ii) the

proposed project, described below, addresses all NDRF sectors and is thus consistent with the State's goal of catalyzing community stabilization and economic revitalization; (iii) the flood risks faced in the area are similar to the risks faced in other estuarine communities so lessons learned can be incorporated; and (iv) there are no USACE flood projection projects currently proposed that focus on the Meadowlands region, unlike other areas of the State. Other factors included feasibility (e.g., improving on the RBD concept and making the project more likely to be realized given the funding shortfall), cost and community acceptance. In consideration of all of these factors, the State decided that Resilience Revitalization, the NJ TRANSIT satellite bus garage, and the resilience planning grant program for inland riverine and estuarine areas was the preferred alternative.

Meadowlands Resilience Revitalization Project: Elevation, buyouts or flood-proofing of the most threatened or repeatedly flooded properties in the target communities were considered as alternatives.

Elevation: Elevation raises structures and critical utilities above base flood elevation levels. According to FEMA, critical utilities within buildings have to be above the "Base Flood Elevation (BFE), the 1% chance of a flood (the "100 Year Flood Level), or the Designed Flood Elevation (DFE), if a community has chosen to exceed FEMA's standard. FEMA's guidance states that new and substantially improved buildings should be elevated above the BFE or DFE. This would include utilities, such as HVAC, electrical, sewage, drinking water and fuel storage and all occupied residential or commercial areas of a structure. Wherever feasible, critical infrastructure, roads, electrical, water and sewer, should not be in a flood zone. New Jersey will ensure compliance for use of its grants funds by requiring that elevating or flood-proofing new construction and substantially improved structures will be to one foot above the latest FEMA issued base flood elevation, and also in in accordance with Executive Order 11988 – Floodplain Management.

Elevating the majority of structures in the target areas would be exorbitantly expensive and in some cases prevent their current use, and would significantly disrupt the local economy. In most cases larger

buildings cannot be elevated without complete demolition and reconstruction. Similarly, commercial interests in this area are largely warehouse, storage and large ground level businesses that rely on surface transportation and access to roads and rail. Elevation of large, ground level facilities would also be prohibitively expensive or would eliminate that use, while added expense for elevation of new buildings could inhibit investments. If elevation was adopted as a long-term solution, implementation and enforcement of proper codes for so many different properties would be extremely inefficient and unlikely to achieve desired goals. Without actions to mitigate flooding threats, repeated flooding in the absence of flood control would continue to destabilize residents, businesses and communities.

Based on Blue Acres data, there are more than 5,200 structures in the target areas that would require elevation if that approach were taken. The average cost for elevating a single family residential structure is approximately $83,000 -- with cost dependent on a variety of factors including the size of the structure). Elevating all structures in the target area would cost more than $431 million (and, of course, some buildings to be elevated are larger, and so costlier, than residential structures). The time involved for elevation, from engaging the homeowner through completion, can take a year or more, and would result in temporary displacement of nearly 20,000 residents.

Buyouts: For structures that cannot be elevated, buyouts are flood-proofing a second alternative. Similar to the objective for elevation, the goal is to prevent danger to human life and health, damage to property and rapid reuse of the structure. Through a buyout, the State purchases a repetitive flood loss structure from a willing seller and converts the property to open space, moving the residents out of harm's way and creating natural buffers to future severe weather events. While the State has aggressively pursued buyouts of repetitive flood loss properties after Sandy, it is not a feasible solution when entire communities face considerable threat of flooding. The cost to purchase that many homes are simply too high to be considered. For the 5,200 structures within the service area that would be buyout targets, the assessed pre-storm value of these properties is over $7 billion. Added to that figure

would be demolition and disposal costs, which can cost as much as $70,000 per structure. The impact of that many buyouts on a ratable base also would be substantial, and buyout recipients (nearly 20,000 people in the target areas) would be displaced until they purchase a new residence.

***Flood-Proofing*:** Flood-proofing reduces inflow of floodwater into a structure to protect critical utilities within the structure or diverts the water safely through a structure (flood-proofing). Examples of making a structure watertight are: (i) sealing structures with impermeable membranes; (ii) abandoning floors that are below base flood elevation level; and (iii) changing or improving drainage to redirect flood waters more quickly. In addition to these steps, structures may have to be anchored to prevent dislodging or uplifting during flood conditions.

While cost estimates for flood-proofing measures vary, some averages costs include: flood-proofing a basement/crawl space ($1,500); relocating water heater ($900); relocating furnace ($2,000 though this figure is extremely variable based on location of water pipes); relocating an electrical panel ($1,000); installing backflow preventers on sewers ($1,000); anchoring a home and fuel tank ($6,400 although this too is highly variable). Based on just these numbers, across 5,200 structures, costs would approach $33.2 million. However, when factoring in that a significant portion of the work would be on commercial structures, warehouses or industrial complexes costs would be expected to substantially increase. And, perhaps most important, (i) addressing utilities does not fully address all other components of a structure that could result in significant financial losses from flooding, and (ii) currently, FEMA's methodology for calculating flood insurance premiums does not incorporate individual flood-proofing measures. This alternative also fails to protect roadways and other vital infrastructure and cannot be expected to catalyze economic revitalization.

***Selected Alternative*:** Initial cost estimate of Meadowlands Resilience Revitalization Project is approximately $236 million, which would be 5% of the cost for the buyout option and at a minimum, and at least $51 million less expensive than the least expensive projected cost of the structure elevation

option. This preferred alternative is also more feasible, since the State will make every effort to avoid having to negotiate easements with private landowners or exercise eminent domain during implementation. Moreover, with this alternative, very few, if any people will be displaced.

NJ TRANSIT Project Alternatives and Selected Alternative: The 90-bus satellite garage was selected as the preferred alternative because it is most likely to be realized with NDR funds while serving the intended purpose of expanding public transportation capacity and connecting populations in the target areas to job centers. Other considered alternatives considered included a 110-bus satellite garage as well as a full 300-bus bus garage, the latter of which would require approximately $225 million of investment from another source. NJ TRANSIT will continue to assess options depending on the results of this NDRC funding request, but within the time required to submit the NDRC application, the smallest option (90 buses) remains most feasible at this time.

Actual Costs for Sandy and Estimated Costs under Alternatives: Superstorm Sandy's impact on Bergen County was devastating as was for other counties in the State. Recent revisions of the flood impacts placed Sandy at about a 100-year storm event, given the increased frequency of storm surge events in the last few decades. For Moonachie and Little Ferry in particular, the streets were filled with (up to) five feet of water within a thirty-minute period of the onset of flooding. The residents needed the help of emergency personnel to rescue them from their homes. Most observers attributed the flooding conditions in riverine and inland areas along the Hackensack River to the storm surge from the ocean at Newark Bay which generated flooding conditions in the Hackensack River, and caused overtopping of the levees or berms, which were designed to protect the community. The flooding conditions which were uneven in their duration and severity resulted from an infrastructure cascade failure, which was unavoidable due to the height of the tidal surge recorded for several hours, and the ensuing insufficiency and incapacity of the general infrastructure in the subject service area to provide relief from the resultant flood waters.

Cost to individuals, insurance and every level of government in Bergen County are as follows:1) cost to individuals $91 million, 2) local governments $10.8 million, 3) insurance $238 million, 4) state government $389 million, and the 5) federal government $51 million. If the NDR berm project had been implemented prior to the disaster, the service area and greater community would have had no flooding or damage to critical infrastructure.

D.2.2 Total Investment in Resilience Necessary & Benefit to Communities

For the Meadowlands Resilience Revitalization Project area, the total project investment would be approximately $236 million for the berm and water control structure and wetlands restoration component, with the berm investment and water control structure severable from the other investments. The 90-bus satellite bus garage is estimated at $75 million; $5 million for the toolkit and the State seeks a final $10 million for flood risk planning grants in inland and riverine communities.

Property Values: Reducing the risk of flooding should directly increase property values in the target areas, and the added benefit of reduced insurance premiums, which also should increase property values. Property values also should be increased by investments in community amenities (parks, etc.) and enhanced public transportation. Across the entire study area, property values are estimated to increase by $17.6 million as a result of the reduced risk and wetlands restoration.

Jobs: One of the most common needs mentioned by constituents in the target areas was enhancing public transportation assets to better connect people in the area to job centers. The NJ TRANSIT investment will better connect target area populations, including the considerable LMI population, with employment opportunities in New York, Jersey City, Newark, and the Meadowlands arena district. Protecting homes and critical infrastructure from flooding also makes it less likely that individuals will not be able to get to their jobs after storm events, enhancing economic resiliency in the area.

Tax Revenues: Resilience should increase ratables along with property values. This should allow towns to provide a broader array of public services and/or reinvest in the community, which would further enhance property values and community attractiveness and create a cycle of revitalization.

Insurance Premiums: Decreased flood risk should mean decreased insurance premiums, which should increase home equity as well as disposable income of households and businesses (that in turn can contribute to more economic activity in the target areas).

Tourism: Enhancing the community amenities (parks, etc.) and increasing access through public transportation investment should increase tourism in the region. Protecting tourism assets and improving the quality of the surrounding natural habitat likewise will positively impact tourism. The total annual value of tourism in the proposed service area is estimated at $122 million.

D.2.3 Past Events and Impacts on Vulnerable Populations

Approximately 66% of the most socially vulnerable households in the Meadowlands target area live within one-half mile of the flood zone. Economic vulnerability was assessed by identifying primary employment areas, specifically warehousing districts in the flood zone. Warehousing districts offer jobs to low-moderate income families, and also are critical stations in a supply chain to get goods to the entire New Jersey-New York metro area.

LMI Population: 39% of the population within the Meadowlands service is at or below 80% Area Median Income, with the majority located in Little Ferry. Much of this population relies on public transportation, so post-storm disruption of public transportation services created significant challenges.

Elderly: Between 8% and 12% of residents of the impacted census tracts were over 65 and living alone. These individuals are least likely to have access to recovery resources, and most subject to the isolation resulting from disruption in transit and social services caused by severe weather events.

Disabled: In Bergen County, 8% of the residents report a disability. Following Sandy, transportation and social service operation disruptions created unique challenges for these individuals.

Homeless: Statistics from the Homeless Management Information System (HMIS) showed a 12% increase statewide in the 3 months after Sandy versus from same period the prior year. It can be challenging for these individuals to access recovery resources, particularly for programs like FEMA Individual Assistance, the goal of which is to return individuals to their "prior housing state."

Limited-English Speaking: Of the total population of 850,300 there are 41,300 Spanish speaking, 26,200 Korean speaking, and 8,300 Polish speaking.[1] Disruption in services to organizations that assist this population caused unique hardships for these populations.

D.2.4 Social, governmental, educational, environmental, or economic factors

This section presents examples of key factors that will contribute to resilience in Bergen County and New Jersey and several factors that could hinder resilience.

***Contributing Factors*:**

Consolidation of Meadowlands Authorities: In February 2015, the Governor signed the "Hackensack Meadowlands Agency Consolidation Act" which merged the New Jersey Meadowlands Commission (NJMC) with the New Jersey Sports and Exposition Authority (NJSEA). The new agency, known as the "Meadowlands Regional Commission" is responsible for all of the functions of the two agencies, including the land use planning, solid waste management, and environmental protection responsibilities of the former NJMC. A major feature of this new law is the ability of constituent municipalities to assume jurisdiction over the review and approval of site plan and bulk variance applications in order to expedite planning review and permitting.

Bergen County and New Jersey Economic Revitalization Tools: Bergen County and the State of New Jersey offer various economic revitalization initiatives in addition to the CDBG-DR Programs

[1] New Jersey Department of Community Affairs Superstorm Sandy Language Access Plan (LAP), January 14, 2015, Version 1, p. 26.

including: The Main Street Disaster Relief Program, Union County Economic Development Corporation Assistance, REBUILD New Jersey Program, The Intersect Fund Disaster Relief Loans, and Cooperative Business Assistance Corporation (CBAC) and Bergen County Workforce Development Job Training and Apprenticeship Program, among others.

Hindering Factors

Riverine Flooding: The project area is also subject to frequent riverine (fluvial) flooding, although the most severe damage to this area is from less frequent but no less damaging coastal flooding. The proposed berm should significantly reduce riverine flooding in communities in the project area, although additional runoff and discharge measures may be necessary.

Landowner Resistance: Although much of the land for the proposed flood control and revitalization efforts is under public management, landowners may resist voluntarily providing or selling easements to facilitate construction. Refusals could result in realignment of the berm and associated public access and ecological restorations or other government measures to ensure access to the properties.

Predicting Future Flood Events: Despite available modeling, predicting the size, frequency and duration of future flood events is not without some uncertainty, and that uncertainty can hinder support, at least initially, for any regional project that incorporates flood protection.

D.3 Appropriate Approaches

As described in Phase 1, this project will stabilize and revitalize an entire region. ***Revitalization through Regional Resilience*** is not a mere flood protection project; rather, it is an innovative way to view resilience investment more broadly by recognizing the numerous additional benefits such projects produce. Using the different sectors of the National Disaster Recovery Framework to strategically address all critical sectors of a region maximizes the value of investment and more likely achieve community stabilization and economic revitalization. Although the project

starts with the Meadowlands Resilience Revitalization Project component, that will mitigate the impacts of severe weather events, but accomplishes much more than that. As stated above, this investment will protect homes and businesses, increase property values, decrease insurance premiums, improve ratables and facilitate community investment which will create a cycle of revitalization. It will protect critical infrastructure, reducing the flooding threat to the electric grid (a vulnerability exposed by Sandy) and protecting drinking and wastewater, transportation and other critical assets. It will improve natural resources by reducing run-off and interconnect with the ongoing clean-up at Berry's Creek and reduce public health risks. It will increase public access to a unique urban ecosystem while enhancing biodiversity. The larger project will be further enhanced by investment in expanding public transportation services through the satellite bus garage. Connecting people to job centers will keep target areas economically vibrant and encourage tourism. There are additional health and community benefits that come from reducing congestion and vehicle emissions. Finally, upon proving the efficacy of ***Revitalization through Regional Resilience*** best practices will be incorporated into a toolkit for use by other estuarine and riverine communities facing similar challenges, not only, in New Jersey but across the country.

The groundwork for implementation is already in place. The project expands on the existing Rebuild by Design concept to broaden its impact and more comprehensively address needs in the target communities (while expanding the communities that will benefit). The existing infrastructure for RBD (while it will need to be expanded to reflect the larger NDR project and the incorporation of the NJ TRANSIT and planning aspects) can be integrated into NDR implementation allowing the State to implement an NDR project relatively quickly.

EXHIBIT E -- SOUNDNESS OF APPROACH

E.1 SOUND APPROACH DESCRIPTION

E.1.1 Project Concept Summary

The concept of ***Revitalization through Regional Resilience*** innovatively reimagines the methodology behind investing in resilience. In the past, flood prevention has been a pure infrastructure investment – build the protection, protect the surrounding environment, measure the return on investment by the extent of protection provided. With limited resources and significant needs across New Jersey and the nation, that narrow view is no longer workable. Resilience investment needs to account for all critical sectors of a region -- housing; economic; infrastructure; local government need; health and social services; and natural resources -- so improvement in one area produces simultaneous advancement of another. Taken together, this far-reaching strategy for resilience is much more likely to stabilize communities and promote economic revitalization across entire regions.

The proposed NDR Meadowlands project is this vision of resilience made real. While the proposed project builds on and expands the area currently under development through one of two Rebuild by Design (RBD) projects in New Jersey -- current RBD funding for the Meadowlands project ($150 million) is at least $100 million less than the lowest implementation estimates of the HUD-selected design team that developed the project -- it is important to recognize that this Phase 2 project is far more than mere completion/expansion of the RBD flood protection berm. Beyond protecting adjacent communities not captured by RBD, the NDR project adds components to make the investment far-reaching by focusing on all NDRF sectors:

Resilience through Berm and Wetlands: The proposed project will expand the proposed RBD berm from the eastern edge of Hackensack at Route 80 northwestern border of Little Ferry down to the eastern border of East Rutherford, and along the southern border (Route 3) of East Rutherford into

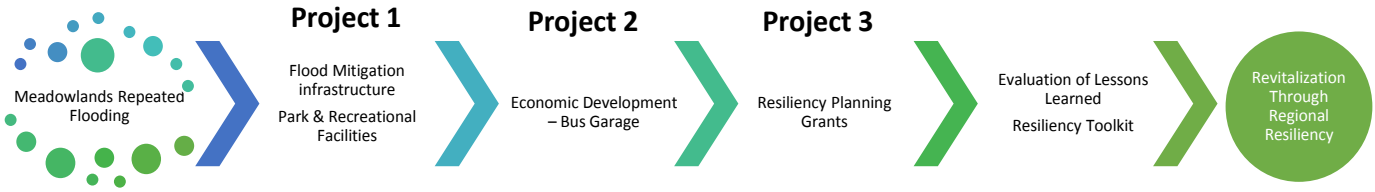
Rutherford and also calls for pumping stations to address rainwater events as well as steps to begin addressing storm water management. Protection against flooding will increase property values and ultimately decrease insurance premiums, which will, in turn, increase property equity and disposable income of ***residents and businesses***. In addition to insulating ***critical infrastructure***, the project should also increase ratables which can allow ***local governments*** to provide more essential public services and/or community development investments, which in turn raise property values creating a cycle of economic revitalization through resilience. Further, along with creating parks and bike trails as well as wetlands restoration, a water control structure is proposed at the mouth of Berry's Creek along the southern border of East Rutherford. Controlling tides can enhance ongoing environmental remediation efforts and, in time, facilitate replacement of invasive phragmites with spartina that, in addition to ***providing a better environment*** for native species, has been shown to leech mercury out of water, providing ***health and economic benefits.***

NJ* TRANSIT *Satellite Bus Garage*:** Community stabilization and economic revitalization is tied to ***access to employment opportunities. Building a satellite bus garage in the Meadowlands Service Area to address economic impacts from Sandy in the target communities and on NJ TRANSIT assets will ***expand service to critical job center***s like New York City, Jersey City, Newark, MetLife Stadium and the estimated 8,000 jobs that will be created by the American Dream shopping center and entertainment project in East Rutherford. More availability of public transportation ***will reduce congestion***, one of the area's most significant economic challenges, and have ***ancillary health and environmental benefits*** by reducing vehicle emissions. Enhancement of public transportation and reducing congestion was routinely mentioned by constituents as an important need.

Planning: The State will work with Rutgers University to develop a toolkit of best management practices from Revitalization through Regional Resilience that can be incorporated by other

communities facing similar flooding and revitalization issues. The last component of the project seeks planning funds for those communities.

The graphic below summarizes the process:



E.1.2 Community Resilience & Decreased Risk to Vulnerable Populations

Improvement in Community Resilience: Community resilience to severe weather events takes various forms. The most obvious is flood protection. Mitigating risk or extent of flood damage to residents, businesses, communities and infrastructure reduces the risk of blight, minimizes the exorbitant costs that can be associated with rebuilding flood-prone and repetitive loss properties, and makes communities more stable. Mitigating other impacts of severe weather events (e.g., run-off that pushes pollutants into water sources) makes communities more resilient by reducing health risks and protecting natural resources and biodiversity. Community resilience also takes the form of economic resilience. Strengthening the resilience of the public transportation system so that people can continue get to work even after severe weather events make a community more economically stable and resilient, as does increasing the connectivity between communities and job centers. And streetscape beautification measures and the addition of amenities (e.g., parks) and environmental enhancements can attract tourism, which increases available funding for local governments to provide essential services to residents and businesses and/or reinvest in community improvements. Finally, resilience has to account for protecting and improving natural resources in the region, which is essential to preserving a healthy environment, maintaining attractive communities and reducing health risks.

A truly resilient project accounts for all of these components of resiliency, which is the foundation of ***Revitalization through Regional Resilience***. This is why, in in addition to proposing a direct

investment to connect people to job centers (economic resilience), the proposal would integrate and enhance natural features such as wetlands and marshes and have the potential to tie in to ongoing remediation efforts in Berry's Creek (natural resources and health resilience) while redirecting water away from homes, businesses and critical infrastructure (housing, economic and infrastructure resilience). To allow public access and recreation, biodiversity and green design, the approach also considers the distinction between hard and soft structures and the characteristics of the physical project location. All efforts should enhance property values, ratables and tourism in the area.

***Decreased Risk to Vulnerable Populations*:** The target areas for the NDR project contain significant LMI, limited-English speaking (LEP) and vulnerable populations (e.g., elderly; single parent households; adults, children and youth who are homeless or at risk of homelessness; people with disabilities or behavioral health needs). The needs of those populations substantially informed the development of this proposal. DEP used two New Jersey-based firms – FEMWORKS and Diversity, LLC -- that specialize in outreach to these in the outreach for and development of this NDR project.

Vulnerable populations face unique risks from severe weather events. Among others, they are more likely to lack the financial resources needed to address costs associated with repetitive flood losses. Significant storm events can disrupt their access to critical support networks (through power outages; transit disruptions; etc.). During outreach, stakeholders also expressed concerns regarding the unique threat of job losses following severe weather events often tying that risk to concerns about resilient public transportation options. They also expressed concerns about other impacts to vulnerable populations that can result from impacts on critical facilities and health impacts from sewage discharges into estuaries that can result if, for example, a wastewater treatment facility lacks power.

All of these concerns informed the development of ***Revitalization through Regional Resilience***. Reducing the extent of potential impacts on homes, businesses, communities and infrastructure from severe weather events through flood risk reduction measures also reduces the likelihood that

vulnerable populations will encounter the unique challenges they face from the impacts of such events (costs of rebuilding; access to jobs or support networks; etc.). The proposed investment to enhance transportation capacity, service and resilience (building the garage out of the floodplain) in the target areas reduces job loss risk and affords these populations more access to job centers. Beyond that, the economic revitalization components of the proposed project, whether in the form of increased property values, environmental improvements, transit access or area beautification should increase revenue to the local government that in turn could be used to enhance services for at risk populations. Furthermore, municipalities under less threat of flooding can divert resources that otherwise would need to be directed toward flood risk to instead serve vulnerable populations.

E.1.3 Outcome Measures

A number of outcome measures can be used to examine the impact of the implementing the proposed NDR project. For the Meadowlands Resilience Revitalization Project component the FEMA depth of flooding/damage cost curve identifies housing and business types for an area is one available outcome measure. Changes to that curve during a frequency event (100 year) will show that flood depth decreases behind the flood structure with an associated lower curve of predicted damage-the damage difference is the savings. Other measures include the number of repetitive flood loss and flood prone properties protected by the investment, as well as costs savings associated with not having a shutdown of businesses, roads, schools and critical infrastructure (electrical facilities; wastewater treatment plants; etc.) as a result of a storm event. Over time, the project could be measured by difference in average ratables prior to and after implementation (although such a measure obviously can be affected by a number of other variables).

For the NJ TRANSIT satellite bus garage, the most appropriate outcome measure would be to compare ridership in the target communities after the building of the garage and expansion of services to ridership before the project was completed.

For the planning project, the most appropriate measure will be the number of inland communities that take advantage of the planning opportunity (which, in turn, will speak to the viability of the toolkit of best practices from the NDR project to be developed in conjunction with Rutgers University) as well as the number of communities that then take steps to implement those plans (e.g., pursue NOAA funding).

All outcomes measures and promising practices will be independently measured by Rutgers. Rutgers will refine the outcome indicators, gather the needed data from public and private resources and report on an interim and final basis once the projects are complete. Rutgers will also develop a toolkit of lessons learned and useful materials.

E.1.4 Project/Program Description

Revitalization through Regional Resilience innovatively reimagines the methodology behind investing in resilience. With limited available resources and significant needs, resilience projects must account for all critical sectors of a region -- housing; economic; infrastructure; local government need; health and social services; and natural resources -- so improvement in one area promotes simultaneous advancement of another. Taken together, this comprehensive strategy for resilience is far more likely to maximize limited resources in a way that stabilizes communities and catalyzes fosters economic revitalization across entire regions.

Areas across New Jersey facing repetitive flooding challenges could benefit from investment through HUD's NDRC, given the breadth of this unmet need selecting a location as the focus of New Jersey's Phase 2 proposal was challenging. Ultimately, New Jersey has selected the first phase of this process to be in a pilot area in the Meadowlands Region of Bergen County. This region was selected primarily because: (i) the region includes significant Low and Moderate Income and vulnerable populations; (ii) the proposed project, described below, addresses all NDRF sectors and is thus consistent with the State's goal of catalyzing community stabilization and economic revitalization; (iii)

the flood risks faced in the area are similar to the risks faced in other estuarine communities so lessons learned can be incorporated; and (iv) there are no USACE flood projection projects currently proposed that focus on the Meadowlands region, unlike other areas of the State. Other factors included feasibility (e.g., improving on the RBD concept and making the project more likely to be realized given the funding shortfall), cost and community acceptance.

Project 1: Meadowlands Resilience Revitalization Project

Once DEP determined that the most viable resilience project should be constructed in the Meadowlands region, DEP used the Meadowlands RBD project proposal as a base concept. The towns in the proposed New Meadowlands service area were severely flooded during Superstorm Sandy. Those towns have no more flood protection today than they did before the storm so existing conditions pose a serious and immediate threat to the health or welfare of the communities within the service area. Although DEP received $150M in funding from HUD to implement the New Meadowlands RBD project, based on the current budget, sufficient funding is not available to complete the resiliency vision described in that proposal. Our NDRC proposal does not seek to duplicate what has already been funded under RBD. Rather, it expands upon what is currently possible under the existing RBD funding by covering a larger area, adding additional flood prevention technologies and measures and tying these efforts to community revitalization, thus leveraging the existing RBD funding to create a more durable, widespread reduction of flooding risk. Our NDR project not only ensures that the concept funded by HUD under RBD can be realized, but also fosters a more encompassing approach to resiliency.

DEP evaluated topographic elevations, areas that consistently flood and were flooded during Superstorm Sandy, existing man-made structures that may also serve in flood protection, property ownership, and probable project costs for areas proximal for potential NDR project locations and approaches.

The project expands the proposed RBD berm, so that it will start at Route 80 near the Hackensack River and travel downstream (southerly) along the Hackensack River to Route 3 and then travel westerly along Route 3 for a distance of 1.8 miles up to approximately Route 17.

A critical factor in developing a flood mitigation project in an estuarine or riverine area is to preserve the natural flood storage and surge reduction functions, while accounting for risks associated with potential climate change and sea level rise. The backbone of the Meadowlands Resilience Revitalization Project will be a berm and water management/pumping system. The berm/pumping stations will preserve natural flood storage and surge reduction functions and address sea level rise. Additionally, based on consultation with the State Floodplain Manager, it is expected that the top elevation of our flood protection structure will be approximately 14 feet (elevation 14). The berm would protect an entire region: Carlstadt, portions of East Rutherford, Hackensack City and Hasbrouck Heights, Little Ferry, Moonachie, portions of Rutherford and Woodridge, South Hackensack and Teterboro.

This project area is a fragile estuarine ecosystem and critical part of the North American Flyway that is crisscrossed with a variety of transportation routes, dotted with Superfund sites, and home to a patchwork quilt of commercial, light industrial and low-density residential developments. In a subtle but significant difference to being developed as a typical colonial port city, the Dutch influence led to structural reclamation via dikes/drains, leaving reclaimed acreage below high tide level.

The service area is generally 2.0-6.0 ft. above sea level and susceptible to storm and tide flood events. The conceptual project goal of is protection against a 500 year flood event.

The project is also proposed to include a large water control structure at Route 3 on Berry's Creek, which is an integral part of the flood control system. Rather than function like a typical tide gate water control structure (opening and closing during daily rising tides), however, the water control structure will be able to open and close at other beneficial times, including during storm events or to facilitate

ongoing remediation efforts of Berry's Creek. Although this project component is innovative with its approach to comprehensive flood protection and public access, the centerpiece of innovation is a flood protection project that also has the potential to restore, enhance and remediate existing wetlands. USACE information indicates that Walden Marsh is approximately 120 acres and highly channelized due to mosquito ditches, and receives tidal influence from Berry's Creek. The site is predominately a common reed (Phragmites australis) monoculture, with highly contaminated soils. It's estimated that 20 tons of mercury exist in a stratified layer in the Walden Marsh soils.

The water control structure may also provide options that could potentially assist in the remedy for the Berry's Creek Superfund site. This water control structure would enable DEP to manipulate water levels upstream of Route 3. Control of the Berry's Creek water may be useful for several reasons. DEP's primary concept for wetland enhancement involves temporarily impounding water to kill the Phragmites Australis. There is currently about 300 acres of Phragmites dominated wetland upstream of Route 3 on Berry's Creek. Phragmites is known as an invasive non-native plant species that tends to establish a mostly impenetrable monoculture with low ecological value. It is also known that under the right conditions that temporary flooding can kill phragmites. Once the phragmites has been killed, conditions would likely be suitable for the establishment of Spartina alternaflora or other beneficial native wetland plant species. Spartina wetland communities provide excellent habitat for wading birds, waterfowl, forage fish and juvenile fish. In addition to the services that a Spartina wetland will provide, it will also produce additional opportunities (locations, species and quantity) for recreational and commercial fishing. Controlled flooding may continue into Eight Day Swamp, further to the north. Eight Day Swamp is a highly contaminated wetland area on the western banks of Berry's Creek. High levels of mercury and other heavy metals are found throughout the site. An estimated 50 tons of mercury are found in a stratified layer within the marsh soils. The Eight Day Swamp is dominated by Phragmites and receives very little tidal flushing. Both Walden Marsh and the Eight Day Swamp are

listed in the U.S. Fish & Wildlife Service "The Hackensack Meadowlands Initiative Primary Conservation Planning report of March 2007 (Figure 21, page 70) as being "Substantial Concern Sites."

The project area described above will benefit from flood protection associated with storm surges as in Superstorm Sandy. Because the concept service area also floods regularly from fluvial or rain events, the project will be designed to reduce rainfall flooding by increasing drainage (cleaning and desnagging creeks and ditches), installing new stormwater conveyance infrastructure, installing pump stations and tide gates at strategic locations, and encouraging green infrastructure to reduce initial runoff.

Construction practices associated with berm construction (i.e. the trapezoidal cross section and dimensions) make this form of flood control suitable to double as a public access feature. This project concept will include adding public access points and will include one or more of the following public access improvements: boat launches, fishing piers, boardwalks, bike paths, bird blinds, walking trails and scenic overlooks. These features will give the local residents and visitors an opportunity to interact with the natural resources. This new opportunity has the ability to increase the quality of life and property values for adjacent and nearby communities. Additional public access to the Hackensack River and its associated tributaries will also provide quicker access during emergencies for first responders.

Project 2: NJ TRANSIT Satellite Bus Garage (90 Buses)

NJ TRANSIT primarily services the Meadowlands Service Areas by bus, and the buses are serviced by a garage in Oradell (outside the Meadowlands region and in a flood zone). To promote economic revitalization of the project service area, NJ TRANSIT proposes to build a 90-bus satellite bus garage in the Meadowlands Service Areas in a resilient manner. Current constraints of the Oradell Bus Garage render NJ TRANSIT unable to accommodate projected additional ridership growth

resulting from growth in housing and economic activity as the Meadowlands becomes a more attractive area for investment. The expanded bus service would connect residents, particularly Low and Moderate Income and vulnerable populations that are more likely to use public transportation, to jobs, education, commercial, retail and entertainment locations.

Through planning and regional analysis, NJ TRANSIT has identified potential locations for a satellite bus garage in very close proximity to Interstate 80, US 46 and State Highway Route 17. The bus garage will have three key benefits:

Enhance transit capacity: Oradell Bus Garage is filled to capacity with 208 buses that are 40 feet in length. Building a satellite bus garage in the Meadowlands Service Areas would greatly enhance bus mass transit capacity in the region. A new bus garage could accommodate buses that are 45 feet in length. NJ TRANSIT estimates that the ability to add 45 foot buses could increase seating capacity substantially.

Improve resilience: The current Oradell Bus Garage is susceptible to flooding from two sources. First, the possibility of a flood because of potential release from the Oradell Reservoir Dam often requires NJ Transit evacuate the facility if all buses. The release of the reservoir provides only a 15 minute window from dry ground to 5 feet under water. This threat occurs approximately 4-6 times per year, during which NJ TRANSIT must incur costs to move the full 208-bus fleet to a leased facility. Second, the garage is susceptible to severe weather events. This exercise costs NJ TRANSIT $387,000 per evacuation and impacts the agency's ability to provide reliable service to customers in the Meadowlands Service Areas and in other areas in Northern New Jersey. In the last decade it has flooded 3 times: the Nor'easter of 2007; Hurricane Floyd (1999); and Hurricane Irene (2011). During Hurricane Floyd in 1999, floodwater released from the Oradell Reservoir Dam inundated the Oradell Bus Garage resulting in more than $1 million in cleanup costs and included the loss of several buses, several private vehicles and overall garage function for months.

The construction of a new, resilient satellite bus garage would contribute to more resilient service opportunities for NJ TRANSIT.

Environmental: A new bus garage could include compressed natural gas (CNG) fueling for buses and solar roof panels to help reduce NJ TRANSIT's energy consumption and its carbon footprint and to provide more resilient energy sources. The expansion and improved provisioning of bus service in the Meadowlands Service Area could fuel local economic activity by creating new jobs, attracting commerce and investment, and providing expanded access to employment opportunities to residents of the Service Areas. These potential opportunities could also contribute to NJ TRANSIT's system-wide resilience.

Project 3: Toolkit and Resiliency Planning Grant Program

DEP will utilize its extensive existing planning tools, criteria, and processes to implement a Regional Resiliency Planning (RRP) Grant Program in the nine Sandy-impacted counties. The RRP Grant Program will provide funding to groups of municipalities (regions) to undergo a comprehensive planning process to identify and address vulnerabilities to increasing hazards due to climate change, protection of environmental resources, and promotion of sustainable/smart growth development. The RRP Grant Program will be implemented in two phases: Regional Planning and Planning Implementation.

The Regional Planning Phase: This phase will fund a comprehensive planning process that identifies vulnerabilities to hazards, evaluates multiple planning scenarios through a public stakeholder process, and develops a Regional Resilience Action Plan (RRAAP) through a detailed cost-benefit analysis. The Planning Implementation phase will fund implementation of specific, regionally-significant, actions identified in the RRAAP. These actions may include, but are not limited to, development of planning documents, ordinance adoption, and project design. The RRP Grant Program will seek to fund six planning projects within multi-municipal regions, within the nine Sandy-impacted

counties. DEP has identified six geographic Planning Areas within these nine counties defined by unique geographic and social characteristics. These characteristics will determine the issues for consideration, types and severity of hazards, and selection of appropriate responses to identified vulnerabilities. Utilization of these Planning Areas will promote replicability of the planning projects, informing further efforts in these areas. The six Planning Areas are:

- Urbanized Northeast: Bergen, Hudson, Essex, Union, Middlesex, Monmouth (north shore) counties.
- Mainland Atlantic Coast: Monmouth (coastal), Ocean (coastal);
- Inland Suburban/Rural: Middlesex (western), Monmouth (inland), Ocean (northern);
- Coastal Bayfront: Ocean (southern), Atlantic (coastal);
- Pinelands: areas within the NJ Pinelands region, parts of Ocean, Atlantic, Cape May;
- Cape May: Cape May

DEP has, over the past several years, developed a comprehensive planning protocol, and a number of tools and guidance to assist in this process. This protocol will be provided in detail in the Notice of Funding Availability (NOFA), and will serve as the basis for all scopes of work. The NOFA will include a detailed description of tasks and process based on the Protocol and will include list of LMI communities. Each project proposal must include: at least three eligible municipalities with a shared boundary; demonstration of commitment; description of past disasters and/or demonstration of threat from future disasters using tools identified

Alternatives Analysis

When the state was deciding on a project for NDRC, several factors had to be considered in this decision. Some of these factors were: location, feasibility, cost, and community acceptance.

In consideration of these and other factors, the DEP decided that pursuing the concept of the New Meadowlands RBD, which includes a berm or floodwall, with wetlands and habitat enhancements,

public access, transit improvements and a planning program, would be the preferred alternative. Other alternatives that were considered but then dismissed due to cost and feasibility issues were as follows:

1) Buyouts – There are over 5,200 residential, commercial and industrial properties within the Service Area. The Service Area is defined as the area that would be protected by the proposed flood wall. These properties have a total assessed value of over $7 billion.. In order to buy out these properties, an independent appraisal would have to be done for each property and a fair market value price would have to then be negotiated with each property owner. According to the DEP Blue Acres program, this appraisal and negotiation process can take approximately eight months to a year to complete with each property. Therefore, with these amounts of properties to appraise, negotiate and purchase, the task becomes too much of a monetary and manpower issue to implement with DEP's current resources. In addition, permanently displacing upwards of 20,000 residents would not be an alternative readily accepted by the community. Finally, the demolition and disposal costs of over 5,200 structures would also have to be considered if this buyout alternative was pursued.
2) Elevation of Structures – There are over 5,200 properties within the Service Area. According to DEP's Hazard Mitigation Grant Program (HMGP), the average cost for lifting a single family residential structure is approximately $83,000. Just based on lifting a single family residential structure, the cost would be over $431 million. This does not consider the complexity, practicality or expense of lifting structures such as multi-story residential buildings, hotels, warehouses, commercial buildings or industrial complexes. An additional cost to consider would be the temporary relocation of the home owners while the elevation process is taking place. According to the HMGP program, the time involved from initial approach to the homeowner to house elevation is approximately 12 to 14 months. Again, temporarily displacing upwards of 20,000 residents would not be an alternative accepted by the community. Therefore, based on the cost and

unacceptability from the community, this alternative was no longer considered. This alternative also fails to protect roadways and other vital infrastructure, and provides no mechanism to prevent aerial flooding or to expedite the removal of flood waters from the community. This option provides limited resiliency benefits since infrastructure will be damaged and cleanup will not occur until waters recede and will be delayed as necessary infrastructure (e.g., roads, power, water, etc.) is repaired/replaced.

Selected Alternative: Initial cost estimate of the proposed berm/flood wall is $236 million, far less than the cost of the other alternatives. Additionally, the flood wall option is much more feasible, since the DEP will make every effort to place the berm/flood wall on properties not owned by private individuals or where structures do not have to be removed or displaced. Access agreements or buyouts with property owners will be necessary but the number of property owners will be limited to less than 200, which is much more achievable than the approximately 5,200 properties presented in options 1 through 3. With this alternative, very few, if any people will be displaced, therefore this option would be more readily acceptable to the community. The Meadowlands Resilience Revitalization Project concept will be fully evaluated during the feasibility phase as well as in the EIS/NEPA process. This process will result in the consideration of additional concepts and approximately three buildable alternatives with one recommended alternative. The approved alternative will be designed and constructed within the required HUD established time frames.

NJ TRANSIT Project Alternatives and Selected Alternative: The 90-bus satellite garage was selected as the preferred alternative because it is most likely to be realized with NDRC funds while serving the intended purpose of expanding public transportation capacity and connecting populations in the target areas to job centers. Other alternatives considered included a 110-bus satellite garage as well as a full 300-bus bus garage, the latter of which would require approximately $225 million of investment from another source. NJ TRANSIT will continue to assess options depending on the

results of this NDRC funding request, but within the time required to submit the NDRC application, the smallest option (90 buses) remains most feasible.

Tie to Unmet Needs and Recovery Issues: Unmet needs in Bergen County and within the municipalities that comprise the target area are described at length in Section B above. To summarize, nearly all of the target municipalities are near sea level and face the ongoing, significant threat of flooding from rainfall events and storm surge from the Hackensack River. Many of these communities, most notably Little Ferry and Moonachie, sustained significant flooding and storm surge damage to housing, businesses and infrastructure as a result of Superstorm Sandy. These communities have a patchwork assemblage of ditches and berms (generally, no higher than 5 feet) that provided no protection against Sandy's storm surge. The overtopping of the berm allowed water up to 6 feet high to flood more than 80% of Little Ferry and Moonachie within 30 minutes of the breaches, forcing the evacuation of residents by boat to a temporary shelter across from Teterboro Airport.

Moreover, according to the 2015 Bergen County HMP, 94% of housing in Moonachie is susceptible to category 1 Hurricane storm surge and 79% of housing in Little Ferry is susceptible to category 1 Hurricane storm surge damage (Table 3.26, pg. 3-89). According to the August 29, 2014 FEMA Flood Insurance Study (FIS) for Bergen County, the Meadowlands area is the most frequently flooded area in Bergen County, impacted annually by nor'easters. FIS determined that communities in the target area are among the most likely to be severely impacted by coastal flooding from a 100-year storm: Moonachie, 98%; Teterboro, 96%; Little Ferry, 87%; Carlstadt, 77%; East Rutherford, 61%; and South Hackensack 50%. And it again warrants mention that the target areas have significant LMI and vulnerable populations, and the impact of severe weather events on them is more pronounced.

In short, the target municipalities are in need of a regional resilience solution that addresses all critical sectors in the region -- housing; economic; infrastructure; local government need; health and social services; and natural resources -- so improvement in one area bolsters advancement of another to

truly stabilize the communities and achieve economic revitalization. As described in detail above in Sections D.1.4, E.1.1, and E.1.4, the proposed environmental protection component tied to an investment in enhancing and expanding public transportation in the region will yield this result.

Eligible Activities: The Meadowlands Resilience Revitalization Project component and the NJ TRANSIT satellite bus garage component are eligible CDBG-DR activities pursuant to Public Facilities Section 105(a)(2); ***Acquisition*** Section 105(a) (1); Relocation Section 105(a)(11);Capacity Building Section 105(a)(16). The planning program is an eligible planning activity under Planning Section 105(a) (12).

National Objective: As described in our Threshold response, New Jersey anticipates meeting the LMI area benefit national objective for our proposed Meadowlands Resiliency Revitalization Project and bus garage. The planned projects will address the flooding concerns and foster revitalization for communities, households and businesses located in the service area. The boundaries of the service area for the Meadowlands Resiliency Revitalization Project and the bus garage will be finalized based on the feasibility analysis and project design/engineering. The map on page 10 depicts the currently anticipated service area, representing 26 Census block groups across 10 towns. The State anticipates that the western border of the service area will be Route 17, which bisects eight of these Census block groups. Without the bisected towns, Census data demonstrates that the service area is 41.78% LMI, which exceeds the Bergen County upper quartile of 39.57%.

E.1.5 Addressing Risks

***Sea Level Rise*:** Sea level rise damages and erodes coastal wetlands due to higher inundation elevation, deposition of sediment and increased water velocity. Coastal wetland loss results in wildlife habitat loss and leads to increased shoreline erosion. Increased shoreline erosion brings the water's edge closer to existing structures and results in an increased risk of structural failure. While it is not possible to predict with certainty the extent to which sea levels will rise over time, sea level rise poses

a clear risk to the target communities. To address that risk, among other things, DEP will assess the proposed Meadowlands Resilience Revitalization Project component using NOAA's Sea Level Rise tool that lays out four different potential sea level rise scenarios (low; intermediate-low; intermediate-high; high). Determination of which scenario will inform the project will be informed by such factors as costs associated with building to higher standards and the opportunity cost of instead spending additional funds to realize other components of the proposed project. The conceptual project goal is protection against a 500 year flood event.

Storm Surge: During coastal storms, storm surge represents a major risk to coastal communities. The surge is caused by strong winds that push water onto shore resulting in coastal flooding. The areas that will be affected by storm surge are determined by the topography and elevation of the land. Storm surge can reach far inland where topography is low and flat. In the NDR project target areas, the most significant damage resulted in storm surge coming up the Hackensack River. Storm surge can cause erosion, structural failure, disruption of utility services, and the destruction of vegetation, food supplies and water supplies. Many low lying residential and commercial structures are present at elevations of 3 to 5 feet in the Project Area resulting in the flooding of hundreds of structures, flooding of roadways which stopped residential traffic and commerce, and the general breakdown of utility services such as sewage treatment and electricity.

To account for the risk of storm surge in implementing the project, DEP will construct the berm or barrier with the necessary water control structures between the Hackensack River and developed areas which serve to hold back future storm surges.

Fluvial Flooding: Portions of the target areas are at high risk for recurring flooding from fluvial (rain) events. Some of these communities experience flooded roadways and parking lots on average about four times per year. The extent of fluvial flooding is exacerbated by tidal fluctuation in the waterways and ditches that reach into the target areas. To account for the risk of fluvial flooding in

implementing the project, DEP will evaluate and implement where appropriate drainage improvements such as ditch cleaning, strategically located pumps stations, green infrastructure, new drainage features, stormwater holding basins, constructed wetlands, and other methods to minimize the risks from fluvial flooding.

Sewage Releases: During Superstorm Sandy, the Bergen County Utilities Authority (BCUA) was inundated by the 8.5 foot storm surge resulting in the shutdown of sewage treatment operations. This shutdown led to the release of hundreds of thousands of gallons of untreated sewage into the Hackensack River. Sewage releases put the community and wildlife populations at risk for exposure to disease and contamination. To account for the risk going forward, in implementing the project DEP will evaluate how the berm will protect BCUA from similar storm surge impacts going forward.

Contamination: There are numerous known contaminated sites in the target areas, including the Berry's Creek Superfund Site. Known and undiscovered contaminated sites pose many risks to the community. During flood events, contaminated sediments and soils can be put into suspension and leech into water sources and be taken into the biota food chain as a result of run-off. Other contamination sources (household trash, commercial waste, petroleum products, etc.) can be dispersed in the same manner. To account for the risk of contamination DEP will implement this project which will reduce the area affected by the storm surge and more effectively manage rain runoff which will minimize the contribution of new contamination into the ecosystem as well as limit resuspension of contaminated sediments.

Increasing Resiliency in the Project Area: The flood protection project will significantly reduce risks posed by sea level rise, storm surge flooding and fluvial flooding. To ensure that maximum resiliency is achieved, the DEP will work with FEMA to establish an appropriate elevation for the flood control structures. The Feasibility Study and Environmental Impact Statement (FS/EIS) will evaluate alternatives and will culminate with the development of a flood control project that aims to

significantly increase resiliency in the community by reducing or eliminating flood risk and preventing failure of waterfront structures. Also, as described in great detail above, resilience will be substantially enhanced by the NJ TRANSIT satellite bus garage and the water control structure at the mouth of Berry's Creek.

Increasing Resiliency in the Region: Although it is very difficult to quantify, the flood protection project will not only improve resiliency inside the Project Area but it also will improve resiliency outside the Project Area. For instance, the elimination of flooded roadways will ensure that workers from within and outside the project area can reach their workplace. Teterboro airport will remain accessible and functional. Regional commerce will operate without delays. Damage caused by flooding and surge to roadways and other infrastructure will be avoided. Amenities of the flood protection project such as the greenways and bike paths will provide recreation opportunities that benefit people that live outside the Project Area. Wetland enhancements will benefit wildlife and will generate additional eco-tourism opportunities for people outside the Project Area. These examples of increased resilience are not readily quantifiable but they will be beneficial to the regional communities.

E. 1.6 Vulnerable Populations

Vulnerable Population Benefit: Project benefits to vulnerable populations are set forth in depth in Section E.1.2. To the extent the NOFA requires restating those benefits here, they are as follows:

The target areas for the NDR project contain significant LMI, limited-English speaking (LEP) and vulnerable populations (e.g., elderly; single parent households; adults, children and youth who are homeless or at risk of homelessness; people with disabilities or behavioral health needs). Census data (from 2000) included in the Borough of Moonachie Master Plan Re-Examination Report (May, 2007), indicates that the 15.3 % of the population is over 65 years old (12.4% national average), and among that group, 39.8% are disabled. In addition, according to the National Center for Education Statistics (2003), 16% of the population of Bergen County lacks basic literacy skills. Of those, 30% are foreign

born and 39% speaking English as a second language. This "at risk" sector of the population presents a growing need for wage earning jobs and affordable housing. The 2008 Bergen County 10 year Plan to End Chronic Homelessness states that the factors most common to homelessness include unaffordable housing costs (52%) and loss of employment (38%).

Additionally, local officials in the Little Ferry and Moonachie Boroughs estimate that approximately 70% of the residences in these locales are not required to comply with the regulations governed by the NFIP (p. 44 Flood Mitigation Engineering Resource Center – Final Report, 6/14) http://www.nj.gov/dep/docs/flood/final-studies/njit-moonachie/njit-njdep-fmerc-finalreport-06182014.pdf. The majority of these homes were "grandfathered" into subsidized flood insurance, but are unable to realize anticipated market value and move because subsequent owners will face higher, unsubsidized flood insurance costs actuarially tied to flood risk in the region.

The proposed project addresses the needs of vulnerable populations in several ways. Reducing the extent of potential impacts on homes, businesses, communities and infrastructure from severe weather events through flood risk reduction measures also reduces the likelihood that vulnerable populations will encounter the unique challenges they face from the impacts of such events (costs of rebuilding; access to jobs or support networks; etc.). By becoming more resilient, property equity should rise and insurance premiums should fall, increasing the disposable income of vulnerable populations that own homes. The proposed investment to enhance transportation capacity, service and resilience (building the garage out of the floodplain) in the target areas reduces job loss risk and affords these populations more access to job centers. Beyond that, the economic revitalization components of the proposed project, whether in the form of increased property values, environmental improvements, transit access or area beautification should increase income to the local government that in turn could be used to enhance services for at risk populations. Furthermore, municipalities under less threat of flooding can

divert resources that otherwise would need to be directed toward flood risk to instead serve vulnerable populations.

Training and Employment of Section 3 Residents and Businesses: Components of the proposed project, including certain components focusing on construction, will implicate Section 3. Throughout Sandy recovery, New Jersey has remained committed to Section 3 compliance. Among other things, DCA retained consulting resources to advise on, and monitor, Section 3 compliance for recovery activities. The State would marshal the same resources in connection with the flood protection/transit project to identify all project elements implicating Section 3, to ensure policies and procedures address Section 3 compliance, and to take steps during project implementation to ensure Section 3 compliance.

E.1.7 Program Models & Integration into Holistic Vision

Scalable, Replicable Model: ***Revitalization through Regional Resilience*** serves as a pilot project and laboratory for new ideas in flood control and community revitalization, looking at the impact of resilience investments comprehensively to see how they maximize benefit across all critical sectors in a region. In addition, the project will provide analysis regarding the siting and design of infrastructure. The resulting toolkit will assist other grantees across New Jersey and indeed the county to replicate and implement these ideas. The project will also make explicit links between the creation of protective measures and the subsequent revitalization of the community. The resiliency planning grant program is designed to help push out these ideas to at least six more riverine and estuarine MID areas of New Jersey. The outcome measurement process planned in this proposal is designed to measure the effectiveness of each of these practices and make suggestions for how the best practices developed through this project cancan be scaled or adapted for other communities.

Integration into Existing Plans & Strategies: Since Superstorm Sandy, a number of local projects have been initiated that complement ***Revitalization through Regional Resilience***. DEP has discussed the State's proposed concept with local governments, seeking to couple on-going localized non-

structural flood mitigation projects (storage, drainage and pumping) with the structural flood mitigation project proposed by the State under NDRC. The Meadowlands District relies heavily on a complex network of drainage channels and the post-storm evaluations indicate that there is a delicate balance between vegetative bank stabilization and overgrowth. A few existing projects that work collectively with the planned NDR projects are listed below.

Completed Projects: In Teterboro, there are: (i) the Industrial Ave. stormwater pump station, a new stormwater pump station to convey flow from the airport and the West Riser Ditch to Berry's Creek; and (ii) stream dredging/desnagging along the West Riser Ditch between Route 80 and Industrial Avenue pump station.

Awarded Projects: Through the FEMA Hazard Mitigation Grant Program, $652,970 was awarded to Little Ferry for installation of a self-cleaning grate at Losen Slote Storm water pump station. This regional pump station serves Little Ferry, Carlstadt, South Hackensack, Moonachie and Teterboro. The self-cleaning grate will ensure continued operations during storm events, especially since there is only one means of ingress. In Little Ferry, as part of the Neighborhood and Revitalization (NCR) recovery program administered by the New Jersey Economic Development Authority, was awarded funds to reconstruct and improve the public facility at Lakeview Field. Carlstadt, with funds from the same program, has initiated nearly $5 million in improvements to five different roads and associated drainage inlets within the borough that, among other things, will allow for the continued safe use of during future potential flooding events and will effectively reduce damage from flooding to nearby public and private infrastructure by allowing for proper and timely storm water drainage.

E.1.8 Feasibility

The State of New Jersey recently issued a Request for Proposal (RFP) for feasibility and design work associated with the Meadowlands Rebuild by Design project ($150 million). Anticipating the opportunity provided by the NDRC, the RFP will allow for the firm ultimately selected to perform

feasibility and design work to consider project alternatives, including alternatives that may become possible as a result of receiving NDRC Program funding. Notably, a separate RFP seeks to procure an outside firm to help oversee and manage project implementation, given the proposed scale, to better ensure that implementation is effective.

The New Meadowlands RBD Proposal was developed by multi-disciplinary teams made up of architects, designers, planners and engineers were engaged by HUD and charged with proposing regional and community-based projects that would promote resilience in various Sandy-affected areas. The teams included experts and thought-leaders from around the world. The expanded Meadowlands Resilience Revitalization Project component is founded upon these concepts. The project will address unmet needs, and create more resiliencies by the placement of these berms in addition to wetlands enhancements. The concept is dynamic so it can be altered to accommodate the changing needs of the public or to address any unforeseen circumstances. The feasibility and design that will be subsequent to this concept will conform to accepted design practices, established codes, standards, modeling techniques, and best practices. It is important to recognize that this Phase 2 project is far more than mere completion/expansion of the RBD flood protection berm. ***Revitalization through Regional Resilience*** is innovative in its approach to incorporating resilience through investments that consider and target all critical sectors in the pilot project region. It is innovative to the extent it proposes to use water control structures not merely as protection against rising tides, but also as a mechanism to assist ongoing environmental remediation efforts to improve the area's natural resources and tourism features while also addressing health risks. It is innovative in its use of green infrastructure to control storm water run-off, one of the major causes of water contamination in the target areas. It is broader in scope than RBD, targeting an entire region as opposed to just five communities. It reflects smart planning and building, by accounting for sea level rise and other risks, through NOAA's Sea Level Rise Tool and by incorporating Sea, Lake, Overland Surges from Hurricanes (SLOSH) modeling and overlaying

this data onto current FEMA maps. The conceptual project goal is protection against a 500 year flood event. Thus the project is forecast to last for the foreseeable future. Development of this proposal (like RBD) also expressly sought to account for the needs and challenges faced by Low and Moderate Income and vulnerable populations. And through the toolkit, and targeting the region because of its similarities to other estuarine and riverine areas, ***Revitalization through Regional Resilience*** is replicable.

An additional important point on feasibility that warrants separate mention: The feasibility study for the proposed project expressly must assess potential impacts, if any, that the implementation of flood risk reduction measures would have on upstream and downstream communities. In terms of operation and maintenance costs, the value of O&M investment is estimated to be $520,000 per year, for a total of $26 million over the fifty-year life of the berm.

Finally, while the NJ TRANSIT component also would be subject to a feasibility stage, NJ TRANSIT has significant experience constructing bus garages and has engaged in planning studies to examine opportunities in the Meadowlands Service Areas provided.

E.1.9 Regional Collaboration & Consultation

Regional Collaboration: The State, in developing and implementing ***Revitalization through Regional Resilience***, reaffirms its commitment to the region (including surrounding states), and to engage in formulating and implementing a comprehensive approach to addressing flood control, environmental remediation, public transportation system enhancements, economic development, housing and assistance to the local municipalities.

In the context of Regional Framework, the project is consistent with the overall Master Plans for the State's Consolidated Plan and the NJMRC Master Plans. All of these entities have been contacted and consulted on the project concept. In terms of the Berry's Creek Superfund Cleanup, DEP contacted EPA to make the agency aware of the design concept. The Record of Decision as to how to

clean-up Berry's Creek is tentatively scheduled for 2018. This project would benefit any remedial decision for the Berry's Creek cleanup because it will greatly reduce or eliminate the flooding events in the creek, thus reducing the transport of contaminated creek sediments. It will also preserve potential wetlands enhancements and prevent clean fill transport if any of these components were part of the remediation strategy. DEP is also in discussion with New York State and New York City regarding the State's proposed concept. Finally, as required by the NOFA, DEP has sought an audience with the federal Sandy Recovery Infrastructure Resilience Coordination (SRIRC) regarding the design concept.

Public Consultation: DEP and its partners conducted a comprehensive outreach plan to engage interested stakeholders and the public in the target areas. Primary objectives of the outreach effort were: to better understand all permutations of repetitive flooding impacts on the communities and across the region; to identify unmet needs which must be addressed to stabilize and revitalize the community; to understand any environmental impacts which must be considered; to seek leverage or other supporting leverage that can be committed to the proposed projects; and to identify committed community partners to participate in the implementation of the projects.

To undertake outreach in a coordinated way, DEP utilized two New Jersey firms that specialize in outreach and engagement of vulnerable populations (FEMWORKS and Diversity, LLC) to inform constituents in the target areas, including vulnerable populations, about the project as well as the public information session held on September 2, 2015 (described below). Additionally, DEP team members distributed 15,000 fliers total to notify the public about the public information meeting (and the formal public hearing scheduled for September 29, 2015). Fliers went to libraries, barber shops, community centers, and other locations where people congregate across all target areas: Carlstadt, East Rutherford, Hackensack, Hasbrouck Heights, Little Ferry, Moonachie, Rutherford, South Hackensack, Teterboro, and Wood-Ridge. DEP also distributed graphics with meeting and hearing dates to over 77

Facebook and Twitter accounts, and forwarded text and graphics to five churches to be read to congregations.

Additionally, more than 150 stakeholder organizations were contacted to invite them to attend the public meeting and the public hearing. Invitations for private meetings with DEP were extended to over 90 of these organizations, and resulted in numerous meetings and phone calls, including with housing advocacy groups, social service organizations that support vulnerable populations, and organizations such as NJMRC, the Meadowlands Chamber of Commerce, and the Bergen County Economic Development Commission, and a representative of the Bergen County Executive. Many groups provided valuable input that helped shape this proposal, with examples provided below.

On September 2, 2015, the DEP conducted a public information session at the South Hackensack School from 6:30 p.m. to 8:30 p.m. There were two goals for this meeting: to share information about the State's ongoing development of its NDR application and to answer questions, gain input, and hear concerns from the public about the project proposal. Following a presentation, the 32 meeting participants were broken out into smaller groups at tables with at least one DEP facilitator familiar with the project and a designated note taker. A summary of each table discussion was documented and shared with the entire group at the conclusion of the meeting.

Through all of this consultation, public participation identified certain specific concerns about the cumulative impacts of risks and vulnerabilities of flooding, including; the risk of continued flooding and a lack of flood protection, storm surges flushing and dispersing contaminants to a larger area, diminishment of water quality, mold risk as a result of flooding, disease vectoring from sewage upwelling, economic disruption through business closures and the need for businesses to reopen promptly, road closures, and home value depreciation and the inability of residents to commute to their places of employment. Other concerns include a loss of the characteristics of a community or

neighborhood due to its inability to recover quickly from storm-related events. Common questions that were asked, and a summary of how these questions affected our proposal, include:

We are on the other side of the berm; will the berm create flooding on the other side of the wall/river? While ocean surge flooding will be dominated by the height of the ocean and not by the volume of water displaced by the flood control structure, riverine flooding on the east bank of the Hackensack could be affected by that displacement. As stated above, it is expressly required by the project RFP to consider potential impacts to upstream and downstream communities, as well as in the areas protected by the berm or beyond the berm.

We experience flooding every time it rains. Will this project address repeated flooding and not just storm surge? The project will address both coastal storm surge and routine rainfall flooding, which has been exacerbated by the neglect of structural infrastructure and natural waterways. The proposed funding would be used toward stormwater mapping and other investigation limited to the supporting the feasibility of any recommended tide gates or pump stations

There were once flood gates and ditches designed to address regular flooding from storm events. Will this project repair and restore those flood gates so they can help with the problem? Will the ditches be cleaned so they can function and assist in reducing flooding*?* Many of these features are still in place but may not be functioning as they should or may not have the capacity that is now needed. Flood gates will be evaluated as part of this project and will be repaired or replaced as needed. DEP has taken an active role in communicating with the local municipalities about what ditch cleaning activities can be conducted and the associated permitting requirements. DEP will also evaluate existing drainage ditches and study options to improve drainage which will include ditch cleaning in addition to other technologies that can reduce fluvial flooding impacts (i.e. green infrastructure, storm water retention, bioswales, constructed wetlands, etc.).

E.2 Summary of the BCA

Where feasible, DEP collected quantitative and monetary estimates for the expected impacts of the project. Where monetary estimates were not directly available due to data limitations, we estimated quantitative impacts using a combination of credible and geography-specific quantitative data sources. In some cases, DEP was unable to identify sufficiently applicable or credible quantitative data relevant to the project or service area. In those cases, quantitative assumptions and analyses (e.g., scaling factors) were used to assess the impact on the service area using estimates from nearby localities or recent quantitative studies on hazard mitigation. We estimated several benefits using the FEMA benefit-cost analysis (BCA) toolkit, a tool FEMA uses in conducting benefit-cost analyses for applications submitted under FEMA's Hazard Mitigation Assistance (HMA) Grant Programs.

The largest cost of the covered project is the construction cost of the berm at $3.46 million per year. The next largest cost is the administration and contingency costs for the construction of the berm at $2.64 million per year followed by the bus transit construction cost ($1.50 million per year), bus transit maintenance ($0.90 million per year), wetland construction ($0.58 million per year), recreation zone construction ($0.54 million per year), annual berm maintenance ($0.52 million per year), and land acquisition ($0.50 million per year). The largest benefit of the covered project is avoided residential and commercial damages at $63.87 million per year. The next largest benefit is recreational and health benefits at $7.12 million, followed avoided American Dream Mall damages ($2.45 million per year), avoided utility damages ($0.86 million per year), and wetland ecosystem services ($0.78 million per year). Based on the BCA, ***Revitalization through Regional Resilience*** is eligible for NDR funds.

E.3 Scaling and scoping

There are various ways to scale or scope the different components of ***Revitalization through Regional Resilience***. With respect to the berm, the size of the berm and the breadth of protection it affords across the Meadowlands Region is based on the total amount of funding available for the berm

(outside of O&M, RBD and NDR funding), subject to the results of the feasibility study. As an order of magnitude, current RBD funding for the Meadowlands project ($150 million) is more than $100 million less than the lowest implementation estimates of the HUD-selected design team that developed RBD project (serving a smaller service area than proposed by RBD).

Overall, the entire Meadowlands District encompasses approximately 36 square miles and covers 14 municipalities in two counties, as well as other estuarine and riverine communities statewide. To protect the entire Meadowlands District, as proposed by the RBD team, carries a preliminarily estimated cost of $4 billion. So projects can be scaled up as far as available funding allows, subject to feasibility. If the level of funding proposed in this NDRC application is not awarded, the feasibility phase will need to evaluate (a) protecting a reduced area, (b) utilizing different construction techniques, (c) implementing only rain event stormwater infrastructure projects, (d) minimizing desirable features such as public access to the Hackensack River waterfront that could have been associated with the coastal surge and fluvial flood resistant structures, and (e) reducing or eliminating the public mass transit component of the project. A guiding principle for scaling would be ensuring protection against a 500 year flood event. Wetlands improvements, ecological enhancements and recreational opportunities also could be customized for each location depending on available funds.

Innovative flood management construction designs and procedures will be needed given the composition of the project area. An inadequate budget would strain the necessary innovation considerably. Construction designs also will invariably be dependent on existing and projected land/water elevations which will factor significantly into the scope and cost of the project. Minimum funding levels will be more readily apparent after feasibility and value engineering.

The NJ TRANSIT 90-bus satellite bus garage cannot be scaled down. That is the minimum size for a satellite bus garage that can service the size and number of buses needed to enhance transportation resilience in the target communities. Depending on available funds and design

assessments, scaled up alternatives could include a 110-bus satellite bus garage as well as a full 300-bus bus garage, the latter of which is estimated to cost approximately $300 million and would require significant, at present unidentified non-NDR funds to complete.

The State's prioritization among the different components of its request are (i) additional funding to complete and expand the berm and the water control structure; (ii) funding for wetlands enhancements; (iii) funding for the satellite bus garage; (iv) funding for the toolkit; and (v) funding for the regional resiliency planning grant program.

E.4 Program Schedule

The project schedule for the construction of the Meadowlands Resilience Revitalization component will follow the schedule developed for the Rebuild by Design funded portion of the project which includes a contract award for feasibility/design and construction oversight in mid-October 2015. Feasibility study completion will occur in the fall of 2017. The feasibility phase will include assembling and reviewing existing data and determining where there is insufficient or an absence of useable data as it relates to the existing concepts. Review of existing data will include evaluating existing survey data, bathymetry, geotechnical information, property ownership, contaminated properties, archeologically and historically significant structures and areas, infrastructure, utilities, tidal datum, etc. Based on this review, plans to fill existing data gaps will be developed, approved and executed. The end stages of feasibility will result in a report that will recommend adjusting the concepts as dictated by studies and will also recommend how to best proceed with the design phase.

The preliminary schedule for the new bus facility for 90 additional buses includes three phases: planning/feasibility commencing in 2016 and concluding in 2017. The design and pre-development starting in 2018 and ending in 2019 and the site development beginning in 2020 and final construction completed in 2022.

E.5 Budget

The estimated NDR anticipated budget is for the construction costs of a flood protection system including the environmental and recreational enhancements is $236 million. This amount would be combined with the $150 million appropriated through the RBD competition and would further the project as envisioned but the final budget will be based on a fully feasibility analysis. The RBD award would fund the feasibility and design and portions of the flood protection system. The estimated budget is based on actual costs from DEP from previously completed projects such as the USACE-DEP Green Brook project and DEP's Mantoloking and Brick dune reinforcement project and current

projects such as the Port Monmouth beach and levee/ flood wall system. The wetlands components such as plantings, trail construction, boat ramps and associated items are derived from previous DEP wetland restoration projects, such as Lincoln Park Restoration Project discussed in the Capacity factor. The construction components are partly based on USACE Port Monmouth shore protection project and their construction estimation guidelines.

The estimated project cost developed by NJ TRANSIT for the proposed 90-bus satellite bus garage is $75 million. The budget includes the costs of professional services such as engineering, construction design, surveys, and construction management and inspection, and constructions.

E.6 Planning Consistency

Consolidated Plan*: *Revitalization Through Regional Resilience is consistent with the State's Consolidated Plan and CDBG-DR Action Plans. The State of New Jersey's publicly available, draft 2015-2019 Consolidated Plan identifies the following infrastructure issues: densely populated areas along the Hackensack River did not have risk reduction measures in place at the time and experienced significant flood inundation; excluding the federal share, New Jersey's current estimate of unmet flood risk reduction and resiliency needs totals over $4.9 billion; low-lying facilities in flood hazard areas, such as wastewater treatment plans, were offline for significant periods, causing further damage to facilities and threatening public health; and Superstorm Sandy crippled New Jersey's transit infrastructure, causing a significant impact on NJ TRANSIT services system-wide.

The State continues to explore ways to improve the resiliency of both infrastructure and public transit. To that end, the draft Consolidated Plan identifies a number of resiliency projects including building new service and inspection facilities for NJ TRANSIT and moving forward on a large-scale flood mitigation project in the Meadowlands area.

Hackensack Meadowlands District Master Plan (2004): The NJMRC Master plan identifies interrelated, district-wide planning systems comprised of the natural environment, economic

development, transportation, housing, community facilities and historic resources. General policies regarding land use and future development in the Meadowlands District contained in the NJMRC Master Plan specific to the project area include the preservation of open space of environmentally sensitive areas, including its wetlands and waterways. With each recovery effort, there is a corresponding increase in the recognition of the critical role that wetlands play in flood storage, habitat creation, and the recreational and economic benefits that they provide. Many of the NJMRC strategies may be attained through implementation of the proposed NDR project, as follows.

***System 1 – Natural Environment*:** The NDR project will help in the plan's goals to: target and prioritize potential preservation sites for acquisition, deed restriction/easements; improve connections among the districts trails and habitats; increase both active and passive recreational uses; control point/non-point pollution through green infrastructure and storm water runoff from developments; and create recreational opportunities.

***System 2 – Economic Development*:** This part of the NJMRC plan calls for: enhanced public areas; improved connectivity among commercial, educational and cultural facilities and activities; realized opportunities provided by brownfield and grayfield sites; strengthened economic partnerships to encourage a variety of commercial and industrial uses at suitable locations that will diversify the District's economic base. Flood protection offered by the NDR project will support these goals.

***System 3 – Transportation*:** Under this part of the plan, NJMRC will: enhance coordination and cooperation among local and regional transportation agencies; ensure that improvements maintain or enhance both the natural environment and safety of transportation facilities; promote vehicular free flow throughout the District; encourage the use of transit through an integrated transit and multi-modal transportation system; promote pedestrian movement and bicycle access in an integrated system; provide pedestrian links among public transit, open space, trails, sidewalks, economic and employment

centers, and housing; and coordinate the development of pedestrian and bicycle trails with NJDOT/NJ TRANSIT.

The NDR project takes significant steps toward all of these goals.

Consistency with the Hackensack Meadowlands Floodplain Management Plan (FMP): The NDR project will be implemented in conformity to the NFIP CRS Activity 510 Guidelines. The New Jersey Meadowlands Commission participates in the FEMA Community Rating System (CRS) on behalf of the 14 municipalities within the Hackensack Meadowlands District. The Floodplain Management Plan was developed in accordance with 44 CFR 201.6 and involves a planning process and risk assessment. In the planning process, the preparation includes organizing interested parties, involving the public and coordinating the implementation (outreach & partnering). Development of the risk assessment section involves assessing the hazard and assessing the problem. In accordance with FEMA requirements, the developed plan focuses on: (i) ensuring that all possible activities are reviewed and implemented so that the most appropriate solutions are used to address the hazard (feasibility, alternatives analysis); (ii) ensuring that activities are coordinated with each other and with other community goals, objectives, and activities, preventing conflicts and reducing the costs of implementing individual activities (outreach, strategic location of water control project); (iii) educating residents about local flood hazards, loss reduction measures, and the natural and beneficial functions of floodplains (outreach); (iv) building support for projects that prevent new problems, reduce losses, and protecting the natural and beneficial functions of floodplains (outreach, partnering, Rutgers/NJIT analysis, feasibility); and (v) building a constituency that wants to see the plan's recommendations implemented (outreach, partnering, public hearings). The NDR project will increase storage capacity and address ultimate discharge to the surface water bodies draining to the Hackensack River and is consistent with NJ Stormwater Management Rules because ground water recharge is not necessary where there's a high ground water table, where the land is being re-developed, or where there are

pollutants either stored on the site or within the soil. The Floodplain Management Plan (FMP) includes a recommendation on installing a water control mechanism on Berry's Creek in coordination with the USACE. The proposed project recommends a similar water control mechanism to be evaluated as part of the feasibility study.

The FMP also promotes the formulation of a habitat enhancement program for the preserve areas, as well as edge parks and waterfront park areas for the public. The NDR project will have active and passive recreational facilities with connections to the water, residences and offices. Mitigation measures outlined in the FMP for retrofitting businesses and residences include barrier systems with an internal drainage system necessary to remove trapped water and recommends the addition of independent back-up power supply and redundant pump systems. This is consistent with the proposed project, in which the construction of a barrier system complements the on-going localized resiliency efforts of improving drainage, and supplying back-up power supply and redundant pump systems.

EXHIBIT F: LEVERAGE

F.1 Direct Financial Commitments

The NOFA defines direct leverage as funds that will be provided to directly support identified project components from sources other than funds provided through the federal Sandy Supplemental legislation. The State will continue to explore commitments by all levels of government, the private sector and philanthropic community as the project is further refined through feasibility.

Regardless of other potential commitments, DEP will assume responsibility for operation and maintenance of the berm and any ancillary tide gates and/or pump stations. The value of investment is expected to be $520,000 per year, for a total of $26 million over the fifty-year life of the berm. As in the past, annual federal appropriations to the State for these types of projects will be the source of funding for operations and maintenance. Additionally, DEP will invest at least $250,000 of state funds to conduct a feasibility analysis of the replicability of a pilot project throughout estuarine communities within and outside MID counties.

NJ TRANSIT will also provide $900,000 annually in non-federal funding for operation and maintenance of the 90-bus satellite bus garage. The typically referenced useable life for similar assets is forty years, making the cumulative leverage for this component $36 million.

F.2 Supporting Commitments & Co-benefits

The following supporting leverage will be documented in the attachments to our application:

- The New Jersey Economic Development Authority provided $410,507 in state funds to service area companies to incentivize environmental cleanup and energy efficiency.
- The New Jersey Environmental Infrastructure Financing Program (NJEIFP) which is jointly administered by the New Jersey Environmental Infrastructure Trust (EIT) and the New Jersey Department of Environmental Protection will be a major partner in the Meadowlands project, adding decades of expertise and experience in providing low-cost financing for water infrastructure

projects. In the upcoming State Fiscal Year 2017 funding cycle, the NJEIFP anticipates the application and funding for the following Bergen County Utility Authority (BCUA) projects: Little Ferry Plant improvements ($54.2 Million), Power Supply resiliency improvements ($42 Million), Little Ferry Storm Repairs ($19.6 Million) and Pump Station Resiliency ($2.5 Million). In addition the BCUA has been appropriated $16.3 Million in the State Fiscal Year 2016 program and to date has received a short term financing construction loan in the amount of $8 million for Power Supply Resiliency at the Treatment Plant. This project is currently under construction.

- The New Jersey Department of Environmental Protection leads the State's efforts as the State's NFIP Coordinator and Community Rating System support. The NJMRC (on behalf of the municipalities within its jurisdiction) participates in the Community Rating System (CRS) program. As of February 2014, the State received a total annual flood insurance premium CRS discount that represented 10.9% of the total annual premium for the State. The NJ Dam Safety program, state storm water management requirements, and the development of all hazard mitigation plans, are some of the state level efforts that provide CRS credits for all New Jersey municipalities, resulting in reduced premiums for property owners.
- More than $2.5 billion in combined private investments and tax credits are facilitating the completion of the American Dream shopping center and entertainment project in East Rutherford, which upon completion is estimated to generate approximately 8,000 jobs. This combined public/private investment is a significant driver of the NJ TRANSIT bus garage project, as it makes it more likely that the NJ TRANSIT investment in increased capacity and service in the target areas will achieve the economic revitalization through connectivity to job centers envision by the project.

EXHIBIT G: REGIONAL COORDINATION & LONG TERM COMMITTMENT

G.1 Progress on Commitments made in Phase

In Phase 1, the State of New Jersey identified a number of actions to be taken to increase resiliency and the State's ability to cope with natural hazard including flooding and sea level rise.

G.1.1 Lessons Learned: Coastal Resiliency Program: DEP applied for and received grant funding from the National Fish and Wildlife Foundation's Superstorm Sandy Coastal Resiliency Competitive Grant Program. Funding is used to assess, restore, enhance or create wetlands, beaches and other natural systems for the purpose of protecting communities and mitigating the impacts of future storms and naturally occurring events. The three funded projects are: (i) *Reusing Dredged Material to Restore Salt Marshes and Protect Communities*, which proposes to reuse dredged materials to restore 90 acres of salt marsh for Avalon, Stone Harbor, and Fortescue in New Jersey while enhancing salt marsh to provide wildlife habitat and reduce flooding and erosion impacts on nearby communities; (ii) *Building Ecological Solutions to Coastal Community Hazards*, which will develop, design, and deliver green infrastructure techniques that add ecological value and enhance community resiliency in coastal regions; and (iii) *Enhancing Liberty State Park's Marshes and Upland Habitats*, developing a design to improve Liberty State Park's 40 acres of salt marsh and 100 acres of upland habitat in Jersey City. All three projects are underway and in the design phase.

G.1.2 Legislative Actions: Creation of Office of Flood Hazard Reduction Measures: Following Sandy, New Jersey created a new Office of Flood Hazard Risk Reduction Measures (FHRRM) within DEP. The office, utilizing Sandy recovery funds and other funding to realize critical flood reduction initiatives, remains committed to the implementation and coordination of New Jersey's resiliency efforts and maximizing the impact of flood risk reduction investments. FHRRM is charged with the responsibility for overseeing all of the State's current Flood Hazard Resilience projects,

including the two New Jersey RBD projects. This office also is currently coordinating the expenditure of $100 million in CDBG-DR funding for a flood hazard risk reduction program, which focuses on (i) obtaining easements needed in advance of USACE dune construction projects; and (ii) funding community flood hazard risk reduction measures (recently, five new projects were approved for funding across the State to address repetitive flooding issues). With respect to RBD, the office has selected Dewberry to conduct feasibility for the Hudson River project and is currently finalizing procurement of an engineering firm to complete the feasibility and design study for the Meadowlands RBD project. The procurement is expected to be finalized in October 2015.

G.1.3 Raising Standards: Amendments to Flood Hazard Area Control Act: DEP adopted emergency amendments to New Jersey's Flood Hazard Area Contract Act rules establishing new statewide minimum elevation standards for construction and reconstruction of houses and buildings in areas at risk of flooding. The rule, adopted by emergency action on January 24, 2013, requires all new and reconstructed buildings to be elevated in accordance with the best available flood mapping. The Flood Hazard Area Control Act now requires the lowest floor of habitable buildings in flood hazard areas to be constructed at least one foot above the base flood elevation. In addition to the DEP's elevation standards, buildings in flood zones must meet increased Uniform Construction Code standards that are regulated by DCA and implemented at the local level. All local building officials have been trained on all new requirements and have implemented the new standards. Since January 2013, state building officials estimate that over 57 structures have been elevated under HMGP.

G.1.4 Resilience Actions Related to Plan Updates or Alignments: Studies to Prioritize Flood Control Projects - North Atlantic Comprehensive Study: DEP partnered with USACE on the North Atlantic Comprehensive Study (NACCS). The study includes a coastal framework as well as storm suite modeling, coastal GIS analysis, and related evaluations, for the affected coastlines from New Hampshire to Virginia. The USACE North Atlantic Coast Comprehensive Study identified three

focus areas that will be the subject of feasibility studies with funding proposed in the President's 2016 budget -- two of the three are New Jersey Back Bays and New York-New Jersey Harbor and Tributaries. Feasibility studies are in the early stages of the USACE project continuum which lead to congressionally authorized flood control or storm damage reduction projects and appropriation of construction funds.

In other actions, the State and Meadowlands communities have taken action to increase standards for construction, wetlands preservation, zoning, permeable surfaces, etc. Recommendations are being incorporated into land use, transportation, and hazard mitigation planning. The State is funding resiliency planning grants to local communities in the nine most impacted counties to enable them to incorporate these recommendations into their land use plans. To date 107 grants have been awarded totaling more than $1.6 million and 81 plans have been completed and are beginning implementation. To date, implementation has resulted in GIS system development, Master Plan reexamination, fiscal impact analysis, and permit and application process quality improvement at the municipal level.

Also in response to Sandy, a series of academic studies were commissioned by the State as part of its multifaceted effort to make the State more resilient in the face of future storms. Study areas focused on the Hudson River waterfront, the Hackensack River, the Arthur Kill, the Barnegat Bay watershed, and the Delaware Bay. Critical to the State's resiliency effort, these studies filled important information gaps by focusing on areas of the state that were hit particularly hard by Sandy but were not part of past USACE flood mitigation evaluations.

From these studies, DEP prepared and released a series of recommendations that are leading actions that will better protect areas of the state from the flooding and devastation of future storms.

G.1.5 Resilience Actions Related to Financing and Economic Issues: Blue Acres Buyout Program: Through DEP's Blue Acres Buyout Program, the State's goal is to dedicate up to $300 million to give as many as 1,000 homeowners the option to sell Sandy-damaged homes at pre-storm value in

flood-prone areas of the nine most impacted counties. The Blue Acres Program is the part of New Jersey's Green Acres Program that purchases flood-prone properties in regions subject to severe repetitive flooding. To date 500 buyouts have occurred, which have moved families out of harm's way and, by creating open space, increased natural buffers against future severe weather events.

Rebuild by Design Projects: New Jersey received $380 million in recent RBD allocations from HUD to fund two projects: one focused in the Hudson River region (allocated $230 million) and the other in the Meadowlands region (allocated $150 million) described above. The Hudson River project, known as the "Resist, Delay, Store, Discharge" project, is a comprehensive urban water strategy that would deploy programmed hard infrastructure and soft landscape for coastal defense (resist); generate policy recommendations, guidelines and urban infrastructure to slow rainwater runoff (delay); develop a circuit of interconnected green infrastructure to store and direct excess rainwater (store); and deploy water pumps and alternative routes to support drainage (discharge). This project is currently in the feasibility study phase. The Meadowlands project, also in the feasibility phase, is described above.

G.2 Covered Projects

The BCA for the NDR project describes the following benefits: (i) reduction in flood vulnerabilities for communities inside berm; (ii) accommodation for increased economic development activity (and reduced insurance costs for businesses) where flood-risk is reduced; (iii) increases in the amount of restored habitat and wetlands inside the berm: and (iv) creation of a valuable and highly recognizable recreation and public landscape inside the berm. Taken as a whole, the new Meadowlands Park inside the berm provides identity, value, and important natural systems for this area.

With sufficient funding provided for the identified service area, the following **outputs** would be achieved: (i) a 9 mile berm system that rises 13'-15' above mean sea level (20' around critical infrastructure, such as the Bergen County Treatment Plant) and connects existing high points; (ii) wetlands restoration on the inside of the berm (221 new acres; 496 improved acres); (iii) creation of

new public recreation areas along the inner edge of the berm (55 acres) and (iv) isolation and remediation of highly contaminated waterways at Berry's Creek.

These actions would result in the following specific **outcomes**: (i) reduction of expected property damages due to flooding ($628 million avoided per year) ; (ii) ecosystem and biodiversity impacts such as improvement in water quality (Berry's creek cleanup) and environmental benefits derived from wetland habitat creation (496 improved acres and 221 new acres for a total annual wetlands value of $5.3 million); (iii) improved identity and social cohesion in that the project will help to give stronger identity to the area, and the berm will both provide a symbolic edge/entrance/center to both the natural system of the Meadowlands and to the communities around it, turning what are currently disjointed development areas into a unified and distinct district; (iv) increased property values: property values are expected to rise substantially along the berms because of better flood protection and adjacency to new parks ($93.9 million); and (v) creation of recreational zones that fall on the inside of the berm and provide easy recreational access to surrounding residents. Fifty-five new acres of active parks are expected to generate $41,000 in recreational benefits in total and $3.4 million in health benefits in total to existing residents per year.

G.3 Long term Commitments with Specific Quantifiable Outcomes

The following table summarizes a baseline and outcome for the specific protection measures undertaken by New Jersey.

Category	Action/Commitment	Baseline	Anticipated Outcome(s)	Duration
Lessons Learned: Actions taken to update plans & alignment	DEP Office of Coastal and Land Use Planning to modify existing tools and that have proven effective in coastal communities to apply to inland and riverine communities (i.e. CCVAMP – CVI, GTR and CVA	Only one of the Meadowlands communities in the project area has taken action to update land use plans and implement resiliency measures to date.	All of the communities (6) in the Meadowlands and other estuarial communities will use these tools to update master plans, building codes, smart growth, and resiliency & adaptive plan	This program will continue with NOAA, CDBG-DR and local funding until all Meadowlands communities have been served. Anticipated duration 3 to 5 years.

Category	Action/Commitment	Baseline	Anticipated Outcome(s)	Duration
Increased levels of insurance coverage	DEP's Office of Engineering and Construction works with NFIP regarding the community rating system. The NJ Dam Safety program, state storm water management requirements, and the development of all hazard mitigation plans, are some of the state level efforts that provide CRS credits for all New Jersey municipalities, resulting in reduced premiums for property owners. .	15%	Efforts are currently underway by the municipalities within the Meadowlands Regional Commission's jurisdiction to inform residents and businesses of the importance of securing NFIP coverage. While there have been substantial reductions in rates secured through state and local actions, additional reductions (over and above current 10%) for property owners within areas protected by the new berm, and in communities that have taken steps to update elevation requirements,	Upon completion of berm

	land use plans, and other resiliency measures are anticipated. The anticipated additional reduction in premiums is targeted at a minimum of 5%, enabling more homeowners to afford to be insured with the NFIP program.

Category	Action/Commitment	Baseline	Anticipated Outcome(s)	Duration
Increased access to Meadowlands employment centers by those reliant on public transportation	With the addition of the new bus garage in the Meadowlands service area, transit capacity and service opportunities would be increased, addressing need caused by new economic and housing activity in the service area. This also increases resilience by constructing the garage in an area not prone to flooding.	Currently no bus garage within Meadowlands service area and prior flooding leaves the area without reliable mass transit service.	Mass transit services will be expanded to serve thousands of additional riders per year.	Beginning with completion of bus garage, projected for 2019

APPENDIX I - PHASE 2 CITIZEN PARTICIPATION AND CONSULTATION SUMMARY CHART

Name or Stakeholder Group	**Agency, Agency Type- Target Population**	**Type of Outreach**	**Method of Notification -Materials Provided**
Housing Advocacy Groups			
David Rammler	Fair Share Housing	NJDEP and Governor's Office of Recovery and Rebuilding met with Fair Share Housing on 8/20/15 to discuss RBD project and NDRC application	Summaries of RBD project and NDRC application. Provided public meeting flyers for distribution and map and bullet points for further discussion with groups unable to attend.
Arnold Cohen	Housing and Community Development, NJ	NJDEP and Governor's Office of Recovery and Rebuilding met with Housing and Community Development NJ on 8/20/15 to discuss RBD project and NDRC application	Summaries of RBD project and NDRC application. Provided public meeting flyers for distribution and map and bullet points for further discussion with groups unable to attend.
Rob Esposito	Bergen County Division of Community Development (BCDCD)	NJDEP met with BCDCD on 8/20/15 to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Drew Curtis	Ironbound Community Association	NJDEP and Governor's Office of Recovery and Rebuilding had a conf. call with	Summaries of RBD project and

APPENDIX I - PHASE 2 CITIZEN PARTICIPATION AND CONSULTATION SUMMARY CHART

		Ironbound Community Association on 8/31/15	NDRC application
County Government			
Bergen County Executive		E-mail and meeting with County Executive representative. Invitation to public information session and public hearing.	
All Disaster –Affected Units of General Local Government (UGLG)			
Michael Capabianca	Administrator, Borough of Little Ferry	Meeting with NJDEP and Little Ferry Administrator to discuss RBD Project and NDRC application on 8/31/15. Invited to Public Information Session NJDEP is holding on 9/1/15. E-mail and call to invite to public hearing.	
Michael Kronyak	Borough Administrator Hasbrouck Heights	Meeting with NJDEP and Hasbrouck Heights Administrator to discuss RBD Project and NDRC application on 8/31/15. Invited to Public Information Session NJDEP is holding on 9/1/15. E-mail and call to invite to public hearing.	
John P. Watt	Mayor, Borough of Teterboro	Meeting with NJDEP and Teterboro to discuss RBD Project and NDRC application on 8/31/15. Invited to Public Information Session NJDEP is holding on 9/1/15. Email and call to invite to public hearing.	
MaryEllen Lyons	Superintendent, Boro of Moonachie	Meeting with NJDEP and Moonachie to discuss RBD Project and NDRC application on 8/31/15. Invited to Public Information Session NJDEP is holding on 9/1/15. Email and call to invite to public hearing.	
William Roseman	Mayor, Carlstadt Borough	Invited to meeting with NJDEP Administrator to discuss RBD and NDRC. Invited to public information Session on 9/1/15 and offered another meeting to discuss project. Email and call to invite to public hearing.	
James L. Cassella	Mayor, East Rutherford	Invited to meeting with	

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		NJDEP Administrator to discuss RBD and NDRC. Invited to public information Session on 9/1/15 and offered another meeting to discuss project. Email and call to invite to public hearing.	
John Labrosse	Mayor, Hackensack	Invited to meeting with NJDEP Administrator to discuss RBD and NDRC. Invited to public information Session on 9/1/15 and offered another meeting to discuss project. Email and call to invite to public hearing.	
Joseph DeSalvo, Jr.	Mayor, Rutherford	Invited to meeting with NJDEP to discuss RBD and NDRC. Invited to public information Session on 9/1/15 and offered another meeting to discuss project. Email and call to invite to public hearing.	
Walter Eckel	Mayor, South Hackensack	Invited to meeting with NJDEP to discuss RBD and NDRC. Invited to public information Session on 9/1/15 and offered another meeting to discuss project. Email and call to invite to public hearing.	
Paul Sarlo	Mayor, Wood-Ridge	Invited to meeting with NJDEP to discuss RBD and NDRC. Invited to public information Session on 9/1/15 and offered another meeting to discuss project. Email and call to invite to public hearing.	
State and Local Heath Agencies			
Nancy L. Mangieri	Bergen County Health Dept.	NJDEP spoke to Nancy on phone to discuss RBD project and NDRC Application.	Emailed summaries of project and NDRC application
Metropolitan Planning Organizations			
Richard Brundage	North Jersey Transportation Authority (long term Transportation Planning	Phone call – NJDEP discussed the RBD project and the	

	organization)	NDRC application.	
Economic Development Districts/interest groups			
James Kirkos	Meadowlands Chamber of Commerce	NJDEP and Economic Development Authority met with the Chamber of Commerce on 8/24/15 to discuss RBD project and NDRC application. Input solicited on needs of business community.	Summaries of RBD project and NDRC application.
Business Community			
LeConte Realty	Susan LeConte Hasbrouck Heights	Meeting to discuss project and seek input on impacts of flooding on real estate	Discussion on project information.
Watershed Councils			
Lori Charkey	Bergen, Save the Watershed Action Network (SWAN)	Invited to attend NJDEP and Meadowlands hosted boat tour of the Hackensack River on 8/24 to discuss project and give visual of proposed project area. Project description of e-mail was provided with invitation to discuss.	Summary of RBD project and NDRC application
Regional Council of Government			
Sharon Mascaro Cheryl Rezenedes	NJ Meadowlands Commission	Invited to attend NJDEP and Meadowlands hosted boat tour of the Hackensack River on 8/24 to discuss project and give visual of proposed project area. Project description of e-mail was provided with invitation to discuss.	Summary of RBD project and NDRC application
Meadowlands Wetlands Interagency Task Force – USACE, USF&WS, USEPANJ Sports and Exposition Authority, NOAA-National Marine Fisheries, NJDEP Land Use		NJDEP met with Task Force Representatives on 8/19/15 to present RBD project and status of NDRC application	Summary of RBD project and NDRC application. Feedback from Task Force about project effect on

			wetlands and how State will work to avoid any impacts.
Tribes within or adjacent to Disaster affected areas			
Roy Bundy	Powhatan - Renape Nation	Phone call 9/14/15	
Gail Gould	Nanticoke Lenni-Lenape Tribal Nation	Phone conversation on 9/14/15 and sent email with project information	
Sherry White Greg Bunker	Tribal Historic Preservation Officer Stockbridge-Munsee Band of the Mohicans	Phone conversation with Greg Bunker on 9/14/15.	
Steven Burton	Ramapough Lenape Nation	Phone conversation on 9/14/15 and sent informational email.	
Daniel Saunders	State Historic Preservation Specialist	Meeting to discuss proposed project concepts.	
Adjacent States UGLGs			
Regional Offices of the EPA and other Federal Agencies			
Doug Tomchuk	EPA (Regional Project Mgr. for Berry's Creek in Meadowlands	Email and phone calls. Scheduled EPA meeting postponed, but to be rescheduled based on EPA's availability.	Summaries of RBD project and NDRC application.
Environmental Organizations			
Tim Dillingham	American Littoral Society	Invited to attend NJDEP and Meadowlands hosted boat tour of the Hackensack River on 8/24 to discuss project and give visual of proposed project area. Project description of e-mail was provided with invitation to discuss.	Summaries of RBD project and NDRC application
Linda Weber	New Jersey Resiliency Network (Sustainable Jersey)	Attended NJDEP and Meadowlands hosted boat tour of the Hackensack River on 8/24 to discuss project and give visual of proposed project area.	Summaries of RBD project and NDRC application
Emma Melvin	New Jersey Resiliency Network (Sustainable Jersey)	Attended NJDEP and Meadowlands hosted boat tour of the Hackensack River	Summaries of RBD project and

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		on 8/24 to discuss project and give visual of proposed project area.	NDRC application
Capt. Bill Sheehan	Hackensack Riverkeeper	Attended NJDEP and Meadowlands hosted boat tour of the Hackensack River on 8/24 to discuss project and give visual of proposed project area.	Summaries of RBD project and NDRC application
David Peifer	Association of New Jersey Environmental Commissions	Attended NJDEP and Meadowlands hosted boat tour of the Hackensack River on 8/24 to discuss project and give visual of proposed project area.	Summaries of RBD project and NDRC application
Christopher Huch	Jacques Cousteau	Attended NJDEP and Meadowlands hosted boat tour of the Hackensack River on 8/24 to discuss project and give visual of proposed project area.	Summaries of RBD project and NDRC application
Barbara Brummer	The Nature Conservancy	Attended NJDEP and Meadowlands hosted boat tour of the Hackensack River on 8/24 to discuss project and give visual of proposed project area.	Summaries of RBD project and NDRC application
Beth Ravit	Rutgers University	Attended NJDEP and Meadowlands hosted boat tour of the Hackensack River on 8/24 to discuss project and give visual of proposed project area.	Summaries of RBD project and NDRC application
Robert Pirani	NY/NJ Harbor & Estuary Program	Attended NJDEP and Meadowlands hosted boat tour of the Hackensack River on 8/24 to discuss project and give visual of proposed project area.	Summaries of RBD project and NDRC application
Kate Boicourt	NY/NJ Harbor & Estuary Program	Attended NJDEP and Meadowlands hosted boat tour of the Hackensack River on 8/24 to discuss project and give visual of proposed project area.	Summaries of RBD project and NDRC application
Jim Lodge	Hudson River Foundation	Secondary invitee from NY/NJ Harbor & Estuary Program	
Erik Kiviat	Director, Hudsonia Ltd. (non-profit research institute)	Invited to attend NJDEP and Meadowlands hosted boat tour of the Hackensack River	Summaries of RBD project and

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		on 8/24 to discuss project and give visual of proposed project area. Project description of e-mail was provided with invitation to discuss.	NDRC application
Community and Neighborhood Groups			
Other Groups			
Jane Linter	Director, Bergen County Human Services	NJDEP met with Jane and others on 8/20/15 to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Rocco A. Mazza	Administrator, Human Services Advisory Council	NJDEP met with Rocco on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Su Nottingham	Advisor, Bergen County Dept. of Human Services	NJDEP met with Su on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Lynne Algrant	Bergen County Volunteer Center	NJDEP met with Lynne on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Kimberly Peto	Bergen Special Child Health Services	NJDEP met with Kimberly on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Erin Beischer	Bergen Special Child Health Services.	NJDEP met with Erin on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Fred Hayo	Bergen Veterans Service Division	NJDEP met with Fred on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Gina King	Bergen County Dept. of Human Services	NJDEP met with Gina on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application

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Sarah Onello	Bergen County Dept. of Human Services	NJDEP met with Sarah on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Leen Wesbrouck	Bergen County Division of Senior Services	NJDEP met with Leen on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Tess Tomasi	Long Term Recovery Center	NJDEP met with Tess on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Regina T. Coyle	Long Term Recovery Center (Little Ferry)	NJDEP met with Regina on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Cindy Sobel	Bergen County Office for Children	NJDEP met with Cindy on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Jim Thebery	Bergen County Division of Disabilities	NJDEP met with Jim on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Cathie Smithward	Bergen County Division of Disabilities	NJDEP met with Cathie on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Angela Drakes	Bergen County Continuum of Care	NJDEP met with Angela on 8/20/15 and others to discuss RBD project and NDRC application.	Summaries of RBD project and NDRC application
Vulnerable Populations			
Gloria M DeLos Santos	Moonachie resident	NJDEP met with Gloria on 9/15/15 and others to discuss RBD project and NDRC application.	

James McGowan	Moonachie resident	NJDEP met with James on 9/15/15 and others to discuss RBD project and NDRC application.	
Jim Avillo	Moonachie resident	NJDEP met with Jim on 9/15/15 and others to discuss RBD project and NDRC application.	
Shanki Pahehel	Moonachie store owner and resident	NJDEP met with Shanki on 9/15/15 and others to discuss RBD project and NDRC application.	
Joyce Owen-Wascha	Moonachie resident	NJDEP met with Joyce on 9/15/15 and others to discuss RBD project and NDRC application.	
Victor M. Ruggerio	Moonachie (or Little Ferry) resident	NJDEP met with Victor on 9/15/15 and others to discuss RBD project and NDRC application.	
Don Torino	Moonachie (or Little Ferry) resident	NJDEP met with Don on 9/15/15 and others to discuss RBD project and NDRC application.	
Organization Name	**Contact information**	**Outreach Method**	**Method of Notification -Materials Provided**
American Legion	(201) 460-9665 412 3rd Street Carlstadt, NJ 07072 familysupport@legion.org http://www.legion.org	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing.
Carlstadt/East Rutherford Lions Club	250 Park Ave. East Rutherford, NJ 07073 Send correspondence to: Carlstadt East Rutherford Lions Club P.O. Box 73 East-Rutherford, NJ 07073	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing.
VFW Post 3149	(201)933-5873	Call by Diversity Inc. to solicit feedback on proposed project	Call. Also,

Schmidt-Hoeger Post	310 1st Street Carlstadt, NJ 07072	and needs of residents.	invitation to public information session and public hearing.
Donne Pugliesi Damerica A New Jersey	(201)460-7038 28 High Street East Rutherford, NJ 07073	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing.
East Rutherford Elks Lodge 547	East Rutherford, NJ 07073	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents	Call. Also, invitation to public information session and public hearing. Flyer
Southwest Senior Activity Center	East Rutherford, NJ 07073	NJDEP conducted phone meeting with Center representative Leen Werbrouck.	Call. Also, invitation to public information session and public hearing.
St Anthony's Guild	(973)777-3737 http://www.hnp.org 4 Jersey Street East Rutherford, NJ 07073	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing.
VFW Post 8374 East Rutherford Memorial Post	East Rutherford, NJ 07073	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing
ACS – Chinese American	(201)457-3859 http://americancancersociety 20 Mercer Street	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation

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	Hackensack, NJ 07601		to public information session and public hearing
American Legion	(201)543-4652 http://www.legion.org 37 Linden Street Hackensack, NJ 07601	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing
American Unidas Multicultural Senior Center	Hackensack, NJ 07601	Center representative Maria Tihui Sanjurio requested private meeting with NJDEP. Some feedback provided via telephone.	Call. Also, invitation to public information session and public hearing.
Hackensack Elks Lodge 658	Hackensack, NJ 07601	Lodge representative was offered a meeting with NJDEP.	Call. Also, invitation to public information session and public hearing.
Hackensack Lions Club	Hackensack, NJ 07601	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing
Hackensack Policemen's Benevolent Association	Hackensack, NJ 07601	Association was offered a meeting with NJDEP and provided information on attending a public meeting.	Call. Also, invitation to public information session and public hearing
Martin Luther King Jr. Senior Center	Hackensack, NJ 07601	Center was offered a meeting with NJDEP and provided information on attending public meeting.	Call. Also, invitation to public

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			information session and public hearing
United Senior Activity Center	Hackensack, NJ 07601	Same as American Unidas Multicultural Senior Center	Call. Also, invitation to public information session and public hearing
YMCA	(201) 883-0300 Http://www.ymca.net 105 Grand Ave. Hackensack, NJ 07601	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing.
YMCA	(201)487-2224 http://ww.ymca.org 75 Essex Street Hackensack, NJ 07601	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing.
YMCA	(201)487-1280 harchontou@ywcabergencounty.org http://www.ywca.org/site/c.culRJ7NTKrLaG/b.7515807/k.2737/YWCA__Eliminating Racism_Empowering_Women.htm 214 State Street Hackensack, NJ 076010	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing
American Legion John H Gertz Post No. 310	(201)641-9774 familysupport@legion.org http://www.legion.org 100 Liberty Street Little Ferry, NJ 07643	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing
Metropolitan Associates	Moonachie, NJ 07074 (MH Community)	Property Manager Paula Ortiz requested private meeting with NJDEP representatives to discuss proposed project.	Call and meeting. Invitation to public information session and

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			public hearing
Vanguard Associates	Janet Blake (201)939-7603 vanguardassociates@yahoo.com 113 Moonachie Ave., Ste 1 Moonachie, NJ 07074 (MH Community)	Spoke to Janet Blake who requested a meeting be set up with NJDEP. NJDEP met with Vanguard Manager to discuss the project and needs of community on 9/1/15.	Call and meeting. Invitation to public information session and public hearing.
55 Kip Senior Center	Rutherford, NJ 07070	Program coordinator Cathy Baviello requested a private meeting with NJDEP representatives.	Call and meeting with senior citizens. Invitation to public information session and public hearing
Masonic Lodge	(201)933-2332 bsl152@verizon.net 169 Park Ave. #A Rutherford, NJ 07070	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing.
Rutherford Downtown Partnership	Rutherford, NJ 07070	Organization was offered a private meeting.	Call. Also, invitation to public information session and public hearing.
Senior Citizens Center	South Hackensack, NJ 07606	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing.
Meadowland YMCA	(201)933-5482 mimbriano@meadowlandsymca.org http://ymc.net 250 Wood Ridge Ave. Wood-Ridge, NJ 07075	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and

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			public hearing.
American Legion Post 97	Wood-Ridge, NJ 07075	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing.
Knights of Columbus Street Anthony Council #11585	Wood-Ridge, NJ 07075	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing
VFW Memorial Post 3616	Wood-Ridge, NJ 07075	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing
VFW Post 3616 Ladies Auxiliary	Wood-Ridge, NJ 07075	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing
Wood-Ridge Lions Club	Wood-Ridge, NJ 07075	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing
Wood-Ridge Senior Center	Wood-Ridge, NJ 07075	Organization was offered a private meeting and the contact recommended reaching out to Rutherford's town clerk.	Call. Also, invitation to public information session and public hearing.
Carlstadt Public Schools	Carlstadt, NJ 07072		Flyer

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William E. Dermody Free Public Library	Carlstadt, NJ 07072	Phone meeting with Library Director Mary Disanza requested meeting with NJDEP representatives to discuss the proposed project.	Invitation to public information session and public hearing. Flyer
Arc of Bergen and Passaic Counties	Countrywide	Executive Director, Kathy Walsh gave feedback and requested a private meeting with NJDEP representatives to review proposed project.	Invitation to public information session and public hearing. Flyer
Bergen Community College	Countrywide		Flyer
Bergen County Fire Chief Association	Countrywide		Invitation to public information session and public hearing. Flyer
Bergen County Hispanic American Lions Club	Countrywide		Invitation to public information session and public hearing. Flyer
Bergen County Korean-American Parents Association	Countrywide		Invitation to public information session and public hearing. Flyer
Bergen County Police Chief Association	Countrywide		Invitation to public information session and public hearing. Flyer
Bergen County Policemen's Benevolent Association	Countrywide		Invitation to public information session and public

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			hearing. Flyer
Bergen County Special Services School District	Countrywide		Flyer
Bergen County Technical Schools	Countrywide		Flyer
Bergen Hudson American Red Cross	Countrywide		Invitation to public information session and public hearing. Flyer
Bergen Regional Medical Center	Countrywide		Flyer
Carlstadt-East Rutherford Regional School District	Countrywide		Flyer
Hackensack University Hospital	Countrywide		Flyer
Jewish Family Services of Bergen County & North Hudson	Countrywide		Invitation to public information session and public hearing. Flyer
YMCA of Greater Bergen County	Countrywide/Hackensack	Organization representative Julie Morrow requested a private meeting with NJDEP. Informed of public information session and public hearing. Also agreed to post flyer ~~up~~ at center for members.	Invitation to public information session and public hearing. Flyer
East Rutherford Memorial Library	East Rutherford, NJ 07073		Invitation to public information session and public hearing. Flyer
East Rutherford School District	East Rutherford, NJ 07073		Flyer
American Red Cross	(201)487-7470 http://www.redcross.org 345 Union Street Hackensack, NJ 07601		Invitation to public information session and

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			public hearing. Flyer
Bergen County Community Action Partnership	(201)342-2323 7 E Salem Street Hackensack, NJ 07601		Flyer
Catholic Community Service	(201)441-9420 174 S. Main Street Hackensack, NJ 07601	Organization was offered a private meeting with NJDEP.	Flyer
Eastwick College	Hackensack, NJ 07601		Flyer
Hackensack Public Schools	Hackensack, NJ 07601		Flyer
Jewish Association For Developmental Disabilities	(201)457-0058 190 Moore Street Hackensack, NJ 07601		Invitation to public information session and public hearing. Flyer
Johnson Public Library	Hackensack, NJ 07601		Invitation to public information session and public hearing. Flyer
Little Ferry Public Library	Little Ferry, NJ 07643		Invitation to public information session and public hearing. Flyer
Little Ferry Public Schools	Little Ferry, NJ 07643		Flyer
Moonachie Public Schools	Moonachie, NJ 07074		Flyer
Chestnut Street Block Association	Rutherford, NJ 07070		
Felician College	Rutherford, NJ 07070		Flyer
Rutherford Public Library	Rutherford, NJ 07070		Invitation to public information session and public hearing. Flyer
South Hackensack School	South Hackensack, NJ 07606		Flyer

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District			
NJ Manufactured Housing Association	Statewide		Invitation to public information session and public hearing. Flyer
Jersey College	Teterboro, NJ 07608		Flyer
Teterboro Airport	Teterboro, NJ 07608	NJDEP spoke to Renee Spann, Airport Administrator to discuss proposed project .	Invitation to public information session and public hearing. Flyer
Wood-Ridge Memorial Library	Wood-Ridge, NJ 07075		Invitation to public information session and public hearing. Flyer
Little Ferry Boys Club	(201)440-6879 Fairview Ave. and Montross Ave. Little Ferry, NJ 07643	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing.
American Legion	(201)531-0656 familysupport@legion.org http://www.legion.org 58 Meadow Rd. Rutherford, NJ 07070	Call by Diversity Inc. to solicit feedback on proposed project and needs of residents.	Call. Also, invitation to public information session and public hearing.
Bible Baptist Church	201- 288-4139 len@biblebaptist.net Passaic Ave. Hasbrouck Heights, NJ	Request for meeting with NJDEP.	Call. Also, invitation to public information session and public hearing.
Corpus Christi Parish	201-288-4844	Request for meeting with	Call.

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	corchris@optonline.net 218 Washington Place Hasbrouck Heights, NJ	NJDEP.	Also, invitation to public information session and public hearing.
ReMax	Louis A. Tedesco, Jr., Little Ferry	Discussed proposed project and impacts to residences and businesses in community	Outreach
Berry Creek Cafe	(201)933-6540 petermazzo@aol.com 55 Moonachie Avenue Moonachie, NJ	Spoke with Peter Mazzo during outreach, discussed proposed project and effects of Sandy.	Outreach

This document presents the BCA requirements per Appendix H: *Phase 2 Benefit-Cost Analysis (BCA) Instructions for Community Development Block Grant National Disaster Resilience (CDBG-NDR) Applicants.*

Contents

1. Process for Preparing the Benefit-Cost Analysis

The process for the preparation of the Benefit-Cost Analysis (BCA) includes several steps. First, the State of New Jersey's Department of Environmental Protection (DEP) developed the costs for the covered project and collected other data and assumptions from the MIT Rebuild by Design report, which covered a large portion of the project area. Second, DEP developed the benefits of the covered project using a variety of sources. The MIT Rebuild by Design report identifies many of the avoided damages from flooding events. DEP supplemented this information with estimates for other services (utility, police, fire) and structures (Teterboro Airport, MetLife Stadium, American Dream Mall) at risk from flooding. Third, the State used the FEMA Benefit-Cost Analysis Toolkit to convert many of the estimates into annualized values based on flood risk levels. The benefits and costs, quantified and monetized where possible, are presented in this section along with the final ratio of benefits to costs (i.e., the BCR).

2. Full Proposal Cost

Table 1 presents the costs of the covered project. Applying a 7% discount, the 50-year estimated total cost of the project is $467.3 million. The largest cost of the covered project is the construction cost of the berm at $3.46 million per year. The next largest cost is the administration and contingency costs for the construction of the berm at $2.64 million per year, followed by bus transit construction cost ($1.50 million per year), bus transit maintenance costs ($0.90 million per year), wetland construction ($0.58 million per year), recreation zone construction ($0.54 million per year), annual berm maintenance ($0.52 million per year), and land acquisition ($0.50 million per year).

Table 1: Summary of Covered Project Costs

Costs	Average Annual Impact (Millions)	50 year Total Discounted Impact (Millions)	
		7 %	3 %
Berm Construction Cost	$3.46	$167.53	$170.67
Annual Berm Maintenance	$0.52	$7.67	$13.77
Bus Transit Construction Cost	$1.50	$72.55	$73.91
Bus Transit Maintenance Cost	$0.90	$13.29	$23.85
Recreation Zone Construction Cost	$0.54	$26.33	$26.83
Admin. and Contingency Costs	$2.64	$127.60	$129.99
Land Acquisition Cost	$0.50	$24.18	$24.64
Wetland Construction Cost	$0.58	$28.15	$28.68
Costs	**$10.65**	**$467.30**	**$492.33**

Source: State DEP

3. The Current Situation

3.1 Critical Information

Impacts of the Qualifying Disaster: During Superstorm Sandy, Bergen County experienced surges that registered approximately 4-5 feet above average high tide. Little Ferry and Moonachie experienced significant flooding due to the tidal surge that overtopped various berms and the edge of the Hackensack River. The massive volume of water was pushed inland from Newark Bay to the Hackensack River. The height of the berms allowed water to flow into Little Ferry and surrounding municipalities and prevented the water from receding to the Hackensack River, or other waterways, creating a 'bathtub" effect until the water could be pumped out. Little Ferry's Main Street Pump

Station did not have a generator, which prevented water from being pumped out and prolonged the "bathtub" effect. (Bergen HMP, page 3-28).

The FEMA provided loss estimation data shows that Bergen County had 27 residential properties with severe repetitive loss and 144 claims with a value of $4,518,894. The FEMA Project Worksheets for Bergen County total 251 with an eligible amount of over $71 million. The extent of the impacts by category are: Category C: Roads and Bridges – 25 Worksheets for $664,143; Category D- Water Control Facilities – 2 Worksheets for $307,421; Category E – Buildings and Equipment – 159 Worksheets for $10,121,550; Category F- Utilities – 35 Worksheets for $59,743,162; and Category G- Parks, Recreational Facilities, and Other Facilities – 30 Worksheets for $565,045.

Homes with major or severe damage in Bergen County account for almost 5% of all major and severe damage across the State. 1% of the households in Bergen County had homes that sustained 'severe' or 'major damage.' The damage is highly concentrated in Little Ferry, Moonachie, and Hackensack. A census track in Little Ferry and a census track in Moonachie had more than 50 households experiencing severe or major damage. A census tract in Little Ferry had 10% of the households experiencing major or severe damage (DCA, CDBG-Disaster Recovery Action Plan, Sept 2013, p. 2-5).

Sandy also heavily impacted the commercial sector in Bergen County. As an indicator, the number of applications issued for Small Business Administration Disaster Loans in Bergen County was 2,394, with an average amount of $164,936, or almost $400 million total. This represented 13% of all businesses. [1]The number of commercial claims was over 4,000; and the Rutgers study noted based on its indicators, Bergen received the most commercial damage impact as measured by number of firms reporting damage as percent of total firms and average size of claims. (Rutgers, Impacts of Superstorm Sandy on New Jersey Towns and Households, p. 60).

[1] County Business Patterns, 2013.

The total amount of lost wages in Bergen County, as a direct result of Sandy, is estimated to be $75,506,325 (Rutgers, Impacts of Superstorm Sandy on New Jersey Towns and Households, p. 25).

The berm and the transit project are designed to provide resilient solutions to mitigate similar potential future impacts caused by flooding events.

Existing Risks and Vulnerabilities: This section presents the vulnerabilities in the area as provided in the Bergen County Office of Emergency Management report, titled Bergen County Multi-Jurisdictional All-Hazards Mitigation Plan 2015 Updated April 2015.

Flood Hazard: According to the August 29, 2014 FEMA Flood Insurance Study (FIS) for Bergen County, New Jersey, which supersedes the September 8, 2005 FIS, principal flooding in southern Bergen County results from tidal stages of the Newark Bay, which affect the Hackensack River, and in turn, Bellman's Creek and Wolf Creek. The tidal influence is negated on Wolf Creek by a tidal barrier located approximately 1,000 feet upstream of the confluence of Wolf Creek and Bellman's Creek. Specifically, the FIS notes that the Hackensack Meadowlands District is impacted yearly by nor'easter storm events. Additionally, nor'easters and hurricanes have produced the largest stream elevations, and not rainfall events. The maximum historical tide was produced by a hurricane on September 3, 1821. The surge was approximately 10 to 11 feet above normal tide.

Flooding is one of the most common and frequently identified hazards in Bergen County. It is also one that Bergen municipalities seek the most assistance for, as outlined in the previous section, along with other water-related hazards. While New Jersey land use regulations are in place to manage future development in flood hazard areas. Bergen County has many older structures vulnerable in and adjacent to flood hazard areas that require protection to improved resiliency from future flooding events.

Wind Hazard: Although Bergen County is in a low risk zone for tornadoes and high winds, it is vulnerable to tornado damage due to the dense development in the County. All municipalities in

Bergen County are equally likely to be impacted by high winds or a tornado. High winds will occur as part of severe weather events in Bergen County and across the State of New Jersey.

Wildfire Hazard: Bergen County has a relatively low probability of being affected by wildfires. The Ramapo Mountain State Forest in Mahwah and Palisades Interstate Park in Fort Lee, Englewood Cliffs, Tenafly and Alpine are considered to be moderate wildfire hazards and the Meadowlands marsh grasses and old landfills are deemed to be a high hazard area. The remainder of the County is developed, lowering the risk of wildfires. A great deal of landfill closure work has been taking place in the New Jersey Meadowlands, further reducing the potential for future wildfires in Bergen County.

Although wildfires can occur at any time during the year, most destructive fires in New Jersey occur during the spring. The weather conditions provide optimal conditions for the rapid spread of wildfires. Bergen County has over 100 critical facilities that are vulnerable to wildfire.

Earthquake Hazard: The longest and most active geologic fault in New Jersey is the Border Fault. The fault, which divides the Highlands and Piedmont Physiographic Provinces, geologically unique regions, extends south from Stony Point, New York to Reading, Pennsylvania. In the north, it passes into New Jersey about half a mile west of State Route 202 in Bergen County, and passes out of northwestern New Jersey north of Stockton in Hunterdon County. The Ramapo section of this fault, known as the Ramapo Fault, extends south from the New Jersey-New York border along two thirds of the New Jersey portion of the Border Fault, and has been the most active section of the Border Fault. Over 25% of the earthquakes experienced in New Jersey over the past 200 years had their epicenters within 30 miles of the fault.

Most earthquakes in Bergen County have been less than 2.5 in magnitude which is usually undetected. A few have been around a magnitude 3.0 which may cause minimal damage, if any.

The New Jersey Geological Survey maps seismic soil properties, including shaking behavior, liquefaction susceptibility, and tendency to landslide. The USGS maps the peak ground acceleration

(PGA) values with a 10% chance of being exceeded over 50 years. PGA is a measure of the strength of ground movements. PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity. If the PGA value is less than 2 (i.e., a gray color), seismic risk is relatively low and earthquakes are not required to be identified as a hazard. Bergen County has a PGA value of 5-6, which means the seismic risk is moderate to high.

Climate Change Vulnerability: The climate change impact of primary concern for Bergen County going forward is the effect of sea level rise on coastal and riverine flooding. As climate science evolves, additional climate change effects on hazards of concern such as drought, extreme temperature, and hurricanes/tropical storms may be evaluated. New Jersey's 2014 State Hazard Mitigation Plan contains new additions related to sea-level rise and climate change (and also address droughts, storms, and other hazards), and supports efforts to make New Jersey more resilient to potential future sea-level rise and other hazards. Specifically, the coastal erosion profile and vulnerability assessment were significantly enhanced to include updated information on the hazard and best-available data. A summary of the twenty-five years of research on the New Jersey coastline conducted by the Richard Stockton College Coastal Research Center was also incorporated. Additionally, a study conducted by Rutgers and the City University of New York, utilized a co-production approach to the assessment of key economic vulnerabilities to climate change in coastal New Jersey. The study demonstrated that economic vulnerability in the region encompasses a wide array of natural and built assets, economic activities and population groups. The study indicated a need for more analysis on how sea level rise and extreme precipitation events will affect natural and built assets, the variability of risks across different types of regions (e.g., inland communities face different risks than oceanfront communities), and potential economic impacts on local businesses and communities. The DEP and other State agencies will continue to employ a science-based risk analysis to analyze forward-looking risks to inform the hazard mitigation process.

***Other/Dam Failure Hazard*:** Bergen County has relatively few dams compared with other counties in New Jersey, and thus has not been as severely impacted by dam failure as other dams across the state. According to the State of New Jersey 2014 Hazard Mitigation Plan, only one Bergen County dam has been affected by the major storms listed in the State Plan. In 1999, Hurricane Floyd caused notable damage to the Whites Pond Dam in Waldwick. Dam failures are rare and normally coincide with events that cause them such as earthquakes, landslides, and excessive rainfall and snowmelt. Dam failures in New Jersey are often caused by heavy rains or other precipitation. The probability of dam failure in Bergen County is low.

Other/Sea Level Rise Hazard: The science of climate risks contains significant uncertainty and continues to evolve. As a result, it is not possible to predict a definitive elevation of sea level rise. At present, scientists at the National Oceanic and Atmospheric Administration, FEMA, USACE, and the US Global Change Research Program, predict that by the year 2100 sea level will rise between 8 inches and 6.6 feet along the coast of New Jersey. Sea level rise poses an increase in frequency and elevation of flooding to communities that already experience flooding and new flood risks to communities that are currently on the fringes of these flood prone areas.

Other/Storm Surge Hazard: During coastal storms, storm surge represents a great risk that floods coastal communities. The surge is caused by strong winds that push water onto shore resulting in coastal flooding. The areas that will be affected by storm surge are determined by the topography and elevation of the land. Storm surge can reach far inland where topography is low and flat. Storm surge can cause erosion, structural failure, disruption of utility services, and the destruction of vegetation, food supplies and water supplies. Storm surge represents a significant threat to the Project Area as demonstrated during Superstorm Sandy when storm surge was reported at depths of 8.5 feet. Many low lying residential and commercial structures are present at elevations of 3 to 5 feet in the Project Area resulting in the flooding of hundreds of structures, flooding of roadways which stopped

residential traffic and commerce, and the general breakdown of utility services such as sewage treatment and electricity.

Other/Fluvial Flooding Hazard: Portions of the Project Area are at high risk for recurring flooding from fluvial (rain) events. Some of these communities experience flooded roadways and parking lots on average about four times per year. The extent of fluvial flooding is exacerbated by tidal fluctuation in the waterways and ditches that reach into the Project Area.

Other/Sewage Releases: During Superstorm Sandy, the Bergen County Utilities Authority (BCUA) was inundated by the 8.5 foot storm surge resulting in the shutdown of sewage treatment operations. This shutdown led to the release of hundreds of thousands of gallons of untreated sewage into the Hackensack River. Sewage releases put human health and wildlife populations at risk for exposure to disease and contamination.

Other/Contamination: There are numerous known contaminated sites within the Project Area, including the extensive Berry's Creek Superfund Site. Known and undiscovered contaminated sites pose many risks to the community. One example of the risks occurs during flood events when contaminated sediments and soils are suspended in the water column, relocated and deposited when flood waters slow and recede. Other contamination sources are dispersed in the same manner. These other sources include various forms of waste such as household trash, commercial wastes and petroleum products from vehicles and roadways.

Existing Social Conditions and Challenges: According to the National Center for Education Statistics (2003), 16% of the population of Bergen County lack basic literacy skills. Of those, 30% are foreign born and 39% speak English as a second language. This "at risk" sector of the population presents a growing need for wage earning jobs and affordable housing. The 2008 Bergen County 10 year Plan to End Chronic Homelessness states that the factors most common to homelessness include unaffordable housing costs (52%) and loss of employment (38%). In the aging communities of the

study area, a shortage of senior housing has been identified in the municipal Master Plan Re-evaluation Reports. Census data (from 2000) included in the Borough of Moonachie Master Plan Re-Examination Report (May, 2007), indicates that the 15.3% of the population is over 65 years old (12.4% national average), and of that, 39.8% are disabled.

Local officials in the Little Ferry and Moonachie Boroughs estimate that approximately 70% of the residences in these locales are not required to comply with the regulations governed by the NFIP (p. 44 Flood Mitigation Engineering Resource Center – Final Report, 6/14). Due to the existing high levels of population density and built environment in Bergen County, housing and economic opportunities have stemmed from redevelopment of existing communities, rather than from the development of vacant land. The majority of residential structures in these communities were "grandfathered" into subsidized flood insurance, but are unable to realize anticipated market value and move, because subsequent owners will face flood insurance cost increases. Other residents have faced up to a ten-fold increase in premiums, which create hardships on fixed income residents. Flood mitigation measures protective of the areas will act to stem and possibly reduce rate increases, while simultaneously encourage the redevelopment of the area with affordable resilient housing, provide economic opportunities and maintain the character of the community.

Table 2 presents the income characteristics for the census tracts that define the target area. As indicated, Little Ferry and Moonachie have census tracks with more than 50% of households have low to moderate income. In Bergen County, 8% of the residents report a disability and 7% of the households occupants are over age 65 and living alone. Of the population of 850,300, 41,300 are Spanish speaking, 26,200 are Korean speaking, and 8,300 are Polish speaking.[2] This document

[2] New Jersey Department of Community Affairs Superstorm Sandy Language Access Plan (LAP), January 14, 2015, Version 1, p. 26.

provides demographic information for Bergen County and the impacted census tracts. LMI households, businesses and communities, as well as vulnerable populations (elderly; mobility impaired; etc.), face significant and unique risks following disaster events and hence are more vulnerable to the risks identified above. In particular, lacking adequate financial resources and social connections, these groups suffer a disproportionate initial impact and face a longer recovery period with diminished chances for success. Our project stakeholders also expressed concerns about potential job loss, risk to public works/infrastructure in the floodplain and sewage discharges into estuaries.

As a result of Sandy, 1% of the households in Bergen County sustained "major" damage. LMI households, businesses and communities, as well as vulnerable populations (elderly; mobility impaired; etc.), face significant and unique risks following disaster events, including the severe flooding events that have routinely challenged New Jersyeans. Other challenges resulting from flooding and other severe weather events may be faced by minority populations or households with limited English proficiency.

Table 2: Income Characteristics of Boroughs in Project Area

Municipality	Block Group	Census Tract	Low Mod	Universe	Percent[3]
South Hackensack	1	236.01	905	1295	69.9%
South Hackensack	2	361	340	1295	26.2%
Teterboro	1	361	250	990	25.2%

[3] Note: Bergen County is an upper quartile exception county. The FY 2014 exception percentage is 39.57%.

Little Ferry	1	291	345	1130	30.5%
Little Ferry	1	292	830	1180	70.3%
Little Ferry	2	291	220	680	32.3%
Little Ferry	2	292	1110	1995	55.6%
Little Ferry	3	291	335	705	47.5%
Little Ferry	3	292	115	615	18.7%
Little Ferry	4	291	600	1370	43.8%
Little Ferry	4	292	365	910	40.1%
Little Ferry	5	292	395	1290	30.6%
Little Ferry	6	292	225	720	31.1%
Moonachie	1	362	620	1970	31.5%
Moonachie	2	362	465	735	63.3%
Moonachie	6	251	430	665	64.7%
Carlstadt	5	50	340	820	41.5%
East Rutherford	3	120.01	605	1970	30.7%

Source: HUD Office of Community Planning and Development, Low Moderate Income Area Data (FY'14) by Block Group, Place, County Subdivision and County for use by CDBG grantees to assist with Low Moderate Income Area Benefit compliance determinations. These data represent a join of

the following datasets: CPD's LMISD Data Tables and Census 2010 geographies. See http://www.arcgis.com/home/item.html?id=9642c475e56f49efb6e62f2d8a846a78.

Table 3: Vulnerable Populations and Data on the Two Census Tracts That Had More Than 50% of the Households Experience Severe or Major Damage

Indicator		Census Tracts with Damaged Homes		
	Bergen County	Little Ferry	Little Ferry	Moonachie
Census Tract		34003029200	34003029100	34003036200
% of HH with Major/ Severe Damage	1%	54%	10%	62%
Households	346,602	2,336	1,888	1,.011
Median HH Income	$83,443	$63,352	$51,796	$56,411
% Households Over 65 Living Alone	7%	8%	12%	7%
% Black HH	6%	1%	7%	2%
% Asian & Pacific Islander HH	12%	11%	29%	4%
% Native American HH	0%	1%	0%	0%
% White (Non-Hispanic)	67%	62%	47%	78%

HH				
% Hispanic HH	14%	20%	13%	14%
% Owner Occupied HH	66%	53%	33%	80%
% Renter Occupied HH	34%	47%	67%	20%

Source: New Jersey Department of Community Affairs, Community Development Block Grant Disaster Recovery Action Plan, January 29, 2013, p. 2-5.

Impact on Lower Income and Minority Groups: Those most vulnerable to disaster are primarily those individuals and households that are of low or moderate income, elderly, disabled, or those where English is not their primary language. The highest concentrations of the elderly and those with disabilities can be found in the areas immediately to the south and east of Teterboro Airport (Moonachie – CT362, BG 1 & 2).These also tended to be the areas with comparatively higher poverty rates (with the exception of the area at the far northern border of the target area, adjacent to the river – South Hackensack CT 361, BG 1)), and lower levels of workforce participation. The highest concentrations of minority populations were also found in this area and in lower poverty areas to the north and west of Teterboro Airport (Teterboro, CT 361, BG 1[4]). These are the populations that often have the least resources, mobility options, and support networks in times of disaster. In general, the target project area averages more than 15% of the population where English is not the primary language.

Rutgers University conducted a study to evaluate the impact of Superstorm Sandy on low-income households in comparison to the damage on overall communities. The results are based on data gathered in 2013. The study focused on households they defined as ALICE (Asset-Limited, Income

[4] Data from Policy Map – census data 2009-2013.

Constrained, and Employed)[5]. Of all the storm-impacted counties, Bergen ranked second on the Household Hardship Index. The index they used to measure Household Hardship was based on the following factors: Scope of financial impact (measured by value of lost wages); Severity of impact (the amount of average FEMA Individual Assistance (IA) award for households below ALICE threshold); and Resilience (percent of households with income below ALICE threshold that registered for FEMA IA and did not have flood insurance). In Bergen County, lost wages were estimated to be $75,506,325. Average FEMA IA assistance was $6,850; and 69% of homeowners had no insurance. Moonachie had one of the highest Household Hardship Indices in the State. It should be noted that very few (10%) of ALICE homeowners received FEMA assistance (statewide). This low award rate may be due to the fact that FEMA funds are often tied to preliminary work being completed, such as removal of asbestos. Many households did not have sufficient funds to complete the required work. A higher percentage of these households had no flood insurance.

The impact of Sandy on the household budgets of these low-income families was substantial, in terms of extraordinary expenses and lost income. Those who opted to stay in their homes had to purchase generators to keep their families warm. Those who could not remain in their homes incurred hotel costs. Families who used child care centers often were required to pay the fees even if the centers were closed. Food lost due to lack of refrigeration had to be replaced, and with no power, many families were forced to eat out, incurring additional expenses. Many households sustained damage to their vehicles. For those without insurance (11% statewide), likely more prevalent in low

[5] The term ALICE (Asset-Limited, Income-Constrained, Employed) comes from a 2012 Rutgers Study, ALICE (Asset-Limited, Income-Constrained, Employed): A Study of Financial Hardship in New Jersey. Families with incomes below the ALICE Threshold account for 34% of New Jersey households, live in all towns in New Jersey, work in service jobs essential to the State's economy and are critical to the functioning of every community.

income households, the cost of repair or replacement fell on the family. Perhaps most devastating was the loss of income. Bergen experienced a high rate of business interruptions, putting many low income residents out of a job, if only temporarily.

3.2 Environmental Conditions

Air and Water Quality: The Bergen County Utilities Authority (BCUA) is responsible for wastewater treatment for forty-seven Bergen County municipalities and solid waste management services for all seventy Bergen County municipalities. The BCUA's two wastewater treatment facilities process over 83 million gallons per day of wastewater. During Superstorm Sandy, the Bergen County Utilities Authority (BCUA) was inundated by the 8.5 foot storm surge resulting in the shutdown of sewage treatment operations. This shutdown led to the release of hundreds of thousands of gallons of untreated sewage into the Hackensack River. Sewage releases put the community and wildlife populations at risk for exposure to disease and contamination.

CERCLA Sites: Fifteen EPA Superfund Sites are in Bergen County (Tetra Tech, State of New Jersey 2014 Hazard Mitigation Plan, p. 5.19-4). Listed below are the four sites within the project area.

Berry's Creek is an approximately 6.5 mile-long tributary of the Hackensack River. Most of the creek is tidal, and tide gates regulate the extent of tidal influence in many of the upland tributaries. The creek originates in the West Riser Ditch near Teterboro Airport, meanders through the reed marshes, and then discharges into the Hackensack River, primarily via the Berry's Creek Canal and also via the lower portion of Berry's Creek. Portions of the creek are located in the Boroughs of Teterboro, Moonachie, Wood-Ridge, Carlstadt, Rutherford, and East Rutherford.

As indicated in the U.S. EPA, Community Update on the Berry's Creek Study Area (BCSA) as of September 2014, the BCSA has historically been associated with mercury contamination originating from the Ventron/Velsicol Superfund site. The Remedial Investigation/Feasibility Study is investigating numerous contaminants within the creek from multiple sources. Two other federal

Superfund sites, the Universal Oil Products site and the Scientific Chemical Processing site, as well as several NJ State listed hazardous waste sites are located in the Berry's Creek watershed. Contaminants are known to be elevated throughout the BCSA surface water and sediment and the levels warrant detailed evaluation of nature, extent and potential risks.

Arsynco Incorporated (Carlstadt): The Arsynco facility is located in a heavy industrial and commercial area at the western boundary of the Hackensack Meadowlands tidal marsh area. The facility consisted of several manufacturing/storage buildings and two ponds situated on approximately 12.3 acres of industrial zoned land. From the early 1900s to 1969, the site was used for a variety of chemical and pharmaceutical manufacturing operations. Arsynco manufactured specialty organic chemicals and pharmaceutical intermediates, propylene imine and derivatives, hair dyes, silicone intermediates, a quaternary ammonium salt, propiophenone, and isobutyrophenone at this property from 1969 to September 1993, when all operations at the site ceased. This site is currently undergoing remediation. Soil and groundwater at the Arsynco site are contaminated due to former site operations (spills, releases and discharges); the disposal of process waste on-site; and the presence of poor-quality, historic fill on the site. Groundwater contamination at the site is also affected by regional groundwater quality and potential up gradient sources. (Source: U.S. EPA Region 2 Website http://www.epa.gov/region02/waste/fsarsync.htm, last updated June 2009).

Scientific Chemical Processing (Carlstadt): EPA added the Scientific Chemical Processing site in Carlstadt, New Jersey to the Superfund National Priorities List on September 1, 1983 because hazardous chemicals were found in the soil and ground water. The six acre superfund site was used as a processing facility for the recovery and disposal of various wastes. Hazardous substances were stored improperly on-site and contaminated the soil and groundwater. On-site ground water and soil contamination include PCBs, heavy metals and volatile organic compounds (VOCs), which are potentially harmful contaminants that can easily evaporate into the air. Off-property ground water and

the adjacent Peach Island Green are also contaminated. Approximately 14,500 residents live within a two-mile radius of the site, and several private residences are within one mile of the site. The site is now vacant. A group of more than 100 potentially responsible parties is conducting the cleanup work at the site. EPA's proposed plan to address the deep and off-property groundwater was issued in August 2012.

Source: U.S. EPA, Region 2 Website

http://www.epa.gov/region02/superfund/npl/scientificchemical/additionaldocs.html .

***Universal Oil Products, East Rutherford*:** EPA added this site to the Superfund National Priorities List on September 1, 1983. The 75-acre superfund site located in Bergen County contained a facility that manufactured various chemicals and recovered solvents. During its operation, Universal Oil Products dumped approximately 4.5 million gallons of waste solvents and solid waste chemicals into two unlined lagoons, contaminating the site. Ground water on-site is contaminated with volatile organic compounds (VOCs), which are potentially harmful pollutants that can easily evaporate into the air. The soil is contaminated with hazardous materials including polychlorinated biphenyls (PCBs) and lead. Approximately 36,500 people within three miles of the site depend on ground water for their source of drinking water. Local industries also use the ground water for industrial processes. People who come into direct contact with or accidentally ingest contaminated soil, sediments, ground water or surface water may suffer health effects. Ackerman's Creek passes through the site, and Berry's Creek borders the southeastern part of the site, running downstream three miles to join the Hackensack River. Local residents use the area's surface water for recreation.

EPA and DEP oversaw the removal of liquids, sludge and sediments from the site's surface. EPA and DEP also monitored a study of the nature and extent of contamination of site soils and ground water. Cleanup of the contaminated soil and a portion of the ground water were completed. Lead-contaminated soil was excavated and placed under the on-site cap. Highly contaminated soil was

removed and transported to a hazardous waste landfill. Ground water was cleaned by an on-site treatment system. The initial investigation of the wetland and creek areas is complete.

In 2005 Honeywell began a long term, comprehensive study of the nature and extent of contamination in the streamlands area of the site. Sampling of the streamlands area has shown that contamination in the vicinity of lagoons where wastewater was once stored is substantially higher than the rest of the site and that contamination has potential to move into other areas. Honeywell signed a legal agreement with EPA to address the contamination in the vicinity of the lagoons. In February 2012 EPA proposed a cleanup plan for a portion of the streamlands area of the Universal Oil Products site.

Source: U.S. EPA Region 2 Website http://www.epa.gov/region02/superfund/npl/universaloil/

Ventron/Velsicol, Wood-Ridge: EPA placed this site on the Superfund National Priorities List on September 1, 1984. The 40 acre superfund site contained a chemical processing plant. Approximately 160 tons of process waste such as mercury may have been buried on the property. Soils, sediments, surface water and groundwater are contaminated with mercury. Off-site sediments and surface water are also contaminated with mercury and other contaminants. Migration of site-related contaminants impacted the neighboring wetlands. The Ventron/Velsicol site is located in a densely populated and industrialized area where there are roughly 11,600 people living within a one mile radius of the site. Discharges from the facility contaminated Berry's Creek with mercury and other chemicals.

The remedy selected in October 2006 calls for; excavation and off-site disposal of contaminated soil, capping of mercury contaminated soils, restrictions placed on contaminated properties, and the establishment of a clean buffer zone between capped areas and creeks or wetlands. A barrier system will be installed to serve as a physical barrier to ground water flow and to encapsulate the areas of highest mercury concentrations under one of the buildings on site. EPA is taking the lead on site investigation and addressing contamination in Berry's Creek and its neighboring wetlands and water

bodies. As of date of this application the barrier wall has been put in place and the on-site contaminated soil has been removed.

Source: U.S. EPA Region 2 Website, **http://www.epa.gov/region02/superfund/npl/ventronvelsicol/**

Stormwater Management Networks: The sanitary and storm sewer systems are separate in these municipalities with the exception of the City of Hackensack. In Hackensack, there are two combined sewer discharges that cover approximately one-third of the city's drainage: one at Anderson St. and one at Court St. These both discharge to the tidal portion of the Hackensack River upstream of the Route 80 crossing over the Hackensack River during some storm events.

Much of the stormwater management network in this area was constructed 50 to 100 years ago. The storm sewer networks constructed during that period were sized for the standards at that time Stormwater management controls were not required until the 1980s and the stormwater network was not designed to address increased runoff due to development as it is today.

The storm sewer systems of these areas generally discharge into tidal or tidally influenced water bodies. The majority of the storm sewer systems are inundated by tidal flooding. High intensity storm events can cause flooding due to inadequate capacities at the inlets or in the storm sewer system. The combination of high tide and a high intensity storm event exacerbates the issue since the discharge from the stormwater network is limited by the elevation of the receiving stream.

Reducing the impact of tidal flooding on the existing storm water infrastructure and creating a means to discharge stormwater into the receiving waterbody will allow the stormwater network to be more effective in managing the runoff from fluvial storm particularly during high tide. These municipalities are all permitted as Tier A for the purposes of the Municipal Stormwater General Permit. The Tier A permit authorizes existing and new stormwater discharges to surface and groundwater from municipal separate storm sewers (MS4). Under this permit, municipalities are required to develop, implement, and enforce a storm water program that is designed to reduce the

discharge of pollutants from the municipality's small MS4 and to prepare a Stormwater Pollution Prevention Plan by addressing six issues: post-construction stormwater management; local public education, improper disposal of waste; solids and floatables controls; maintenance yard operations, and employee training.

Under this Tier A permit, municipalities are required to reevaluate their municipal storm water management plan. The ability to improve the plans is impacted by the existing stormwater infrastructure and the impacts of tidal flooding that limit the effectiveness of the stormwater network.

***Underground Chemical Tanks*:** Within the Project Area there are a total of 263,213 below ground chemical tanks (including underground fuel storage tanks) that are no longer active. These tanks have either been removed or closed in place. There are 50 below ground chemical storage tanks that are active.

Land-Use Patterns and Habitats:

Land Use Breakdown 9.17.15	**Berm Service Area***	
	Acres	**% of Area**
Residential	865.56988	10.621%
Residential Serving/Natural Habitats	3448.333097	42.311%
Non-Residential	3677.48919	45.123%
Redevelopment/Unknown	158.590459	1.946%
Residential + Residential Serving/Natural Habitats	*4313.902977*	*52.931%*
Total Acres	**8149.982626**	**100.000%**
Berm Service Area Excludes: Hasbrouck Heights, Rutherford, Hackensack City, Wood-Ridge, any Bus Service Area Census Groups		

Components of Key Terms, Based on Land Use Data:

Residential - *All Residential (High Density or Multiple Dwelling, Rural Single Unit, Single Unit Low Density, Single Unit Medium Density)*

Residential Serving/Natural Habitats - *Artificial Lakes, Athletic Fields/Schools, Bridge over Water, Cemetery, Deciduous Brush/Scrubland, Deciduous Forest >50% Crown Closure, Deciduous Forest 10-50% Crown Closure, Deciduous Scrub/Shrubland Wetlands, Deciduous Wooded Wetlands, Disturbed Tidal Wetlands, Disturbed Wetlands Modified, Herbaceous Wetlands, Major Roadway, Managed Wetland in Built-Up Maintained Rec Area, Managed Wetland in Maintained Lawn Greenspace, Mixed Deciduous/Coniferous Brush/Shrubland, Mixed Forest >50% Deciduous with >50% Crown Closure, Natural Lakes, Other Urban or Built Up Land, , Old Field <25% Brush Covered, Phragmites Dominate Old Field, Recreational Land, , Saline High Marsh, Saline Low Marsh, Stadiums/Theaters/Cultural Centers/Zoos, Streams/Canals, Tidal Mud Flat, Stormwater Basin, Tidal Rivers/Inland Bays/Other Tidal Waters, Transportation/Communication/Utilities*

Non-Residential – *Airport Facilities, Commercial/Services, Extractive Mining, Industrial, Industrial and Commercial Complexes, Mixed Transportation Corridor Overlap Area, Mixed Urban or Built Up Land, Phragmites Dominate Coastal Wetlands, Phragmites Dominate Interior Wetlands, Phragmites Dominate Urban Area, Railroads, Upland ROW Developed, Upland ROW Undeveloped, Wetland ROW*

Redevelopment/Unknown - *Altered Lands, Transitional Areas*

The ***Revitalization through Regional Resilience*** project will impact several habitats in the project area. In particular:

New Jersey Meadowlands/Hackensack Meadowlands: The Meadowlands is comprised of 7,800 acres and include brackish and freshwater marshes (MIT CAU + ZUS + URBANISTEN, The New Meadowlands, p. 87). The area includes a forest of Atlantic White Cedar. It is the largest brackish

water complex in the New York / New Jersey Harbor Estuary, is increasingly vital to fish and wildlife resources at regional, national, and international levels. At the crossroads of several Atlantic Flyway migration routes, the Meadowlands supports a significant concentration of migratory birds (332 of the 443 species of birds observed in New Jersey). The Meadowlands provides habitat for more than 275 plant species, 50 species of fish and shellfish, 25 species of reptiles and amphibians, and 24 species of mammals. The U.S. Fish and Wildlife Service (USF&WS) has identified 88 species of special emphasis in the Hackensack Meadowlands, including 25 State-listed species and approximately 50 species considered rare in the urban area.

The federal government has taken numerous steps to recognize and protect the fish and wildlife resources in the Meadowlands. The area is identified as important habitat in the USF&WS Migratory Birds Initiative, a "Priority Wetland Site" under the Emergency Wetlands Resources Act, a "Regionally Significant Habitat Complex" in the New York Bight watershed, and as a "Regional Resource Priority" in the USF&WS's Northeast Region. The lower Hackensack River is identified as "Essential Fish Habitat" for 14 species by the National Marine Fisheries Service, whereas the Meadowlands has been designated as an "Aquatic Resource of National Importance" by the EPA and other federal agencies (U.S. Fish & Wildlife Service Ecological Services New Jersey Field Office, Conservation Planning for the Hackensack Meadowlands - The Meadowlands and Its Fish and Wildlife Resources, June 2005).

***Berry's Creek*:** This is a 6.5-mile-long creek, which includes its tributaries, the Berry's Creek canal, and adjacent wetlands. The majority of the creek is tidal, and tide gates located throughout Berry's Creek regulate the extent of tidal influence in the headwater tributaries. The area has been designated a Superfund Study Area, primarily for mercury concentrations in the sediments greater than what is considered to be protective of wildlife. The area is highly industrialized and has a low population density, but zoning is a mix of industrial, commercial, residential, recreational,

redevelopment, and marshland preservation. The creek meanders through the New Jersey Meadowlands and the municipalities of Teterboro, Moonachie, Wood-Ridge, Carlstadt, Rutherford, Lyndhurst, and East Rutherford before discharging into the Hackensack River. The State has issued fish advisories on Berry's Creek. Consequently, it is prohibited to eat, sell, or harvest blue crab in these waters. Additional advisories are in place for striped bass, bluefish, American eel, American catfish, and white perch.

There is currently about 300 acres of Phragmites dominated wetlands upstream of Route 3 on Berry's Creek. Phragmites is known as an invasive non-native plant species that tends to establish a mostly impenetrable monoculture with low ecological value.

Walden Marsh/Eight Day Swamp: Walden Marsh is approximately 120 acres, highly channelized due to mosquito ditches, and located on the West bank of Berry's Creek, adjacent to the NJ Sports and Exposition Authority Sports Complex. The marsh receives tidal influence from Berry's Creek. The site is predominately a common reed (Phragmites australis) monoculture, with highly contaminated soils. It's estimated that 20 tons of mercury exist in a stratified layer in the Walden Marsh soils. Both Walden Marsh and the Eight Day Swamp are listed in the U.S. Fish & Wildlife Service "The Hackensack Meadowlands Initiative Primary Conservation Planning report of March 2007 (Figure 21, page 70) as being "Substantial Concern Sites."

Environmentally Sensitive Areas: All of the communities within the Project area are served by United Water New Jersey (PWSID #NJ0238001). The primary source of the drinking water is surface waters from the Hackensack-Passaic Watershed (USGS Cataloguing Unit# 02030103) that includes much of the eastern half of Northern New Jersey and extends into parts of southern New York. Normally the drinking water is from four reservoirs - Oradell, Woodcliff Lake and Lake Tappan reservoirs in Bergen County, New Jersey, and Lake DeForest Reservoir in Rockland County, New York. Lake DeForest and Lake Tappan reservoirs are located on the upper or freshwater portion of the

Hackensack River. Woodcliff Lake is located on the Pascack Brook, while both the Hackensack River and the Pascack Brook feed the Oradell reservoir. United Water New Jersey also operates wells in Upper Saddle River which supplement supply. Additional supplemental water may be supplied from sources through interconnections with other water suppliers, including the Boonton, Wanaque and Monksville reservoirs. All of the water is treated at the Haworth Water Treatment Plant, Harrington Park, New Jersey.

Trends in Land-Use, Housing Development, and Employment: Bergen County had over 5,000 commercial damage claims and the most calls to the State's emergency hotline for assistance with power and delivery of fuel to service stations. Business interruptions due to property damage and power failures resulted in millions of dollars in lost revenue and wages. The additional flood protection afforded by this project should reduce flood risk, insurance premiums, and business interruptions.

Given the Meadowland's strategic position within the North Jersey/New York City Metropolitan area, post Sandy development will continue to occur. While this puts increased pressure on land use and housing affordability, it will bring increased employment opportunities that do not require extensive advanced education. The expansion of public transportation availability within the service area will give these vulnerable populations better access to the current and anticipated employment centers.

4. The Proposal

4.1 Proposal Objectives

The key objectives of the ***Revitalization through Regional Resilience*** project are:

- Build flood protection measures, including berms and sea walls, taking advantage of and connecting to existing natural and infrastructure flood barriers. These measures will help to prevent future damage to area homes, businesses and public facilities, preventing the repeated,

widespread community impacts seen after each of the major flooding events experienced in these inland and riverine communities. In addition, the proposed flood protection measures will restore damaged wetlands and help to remediate existing environmental contamination.

- Enhance quality of life for the surrounding communities, including several areas with high concentrations of LMI persons, by creating green space, parks, bike and walking paths and other recreational opportunities in the greenway created by the flood protection facilities.
- Provide additional resiliency to commercial businesses, in an area that received the highest number of commercial claims post-Sandy (Rutgers Study).
- Develop improved transit facilities to attract employers, employees, residents and tourists to the area. A new hub for increased buses would enable expansion of service and be more resilient to flood events. Employees from the storm-impacted communities will have improved access to job opportunities throughout the Meadowlands area and helps to address congestion, which together are major factors in the economic revitalization of the pilot area.
- Spur investment in the redevelopment of commercial buildings and facilities damaged by repeated storms in the Meadowlands Resilience Revitalization Project area. Given enhanced flood protection measures, new projects and redevelopment are more likely to occur.
    - Coordinate with existing State and local efforts to rebuild or buy-out owner and rental housing in repetitive flood areas. The ***Revitalization through Regional Resilience*** proposal consists of three projects:
    - Project 1: Meadowlands Resilience Revitalization Project;
    - Project 2: Increasing Transit Capacity; and
    - Project 3: Project 4: Resiliency Planning Grant Program & Toolkit.

Each of these projects is described below. The BCA focuses on the first three projects (i.e., the non-planning related projects).

Project 1: Flood Mitigation and Wetlands Restoration

Estuarine and riverine regions across New Jersey face repetitive flooding challenges from not only hurricanes, other natural disasters and sea level rise but also from significant rainfall events. Many New Jersey communities could benefit from investment in community-wide or regional flood protection investment through HUD's NDRC. Given the breadth of this unmet need, selecting one location as the focus of New Jersey's Phase 2 proposal was challenging. Ultimately, the Meadowlands Region was selected primarily because:(i) the region includes significant LMI populations; (ii) the flood protection/transit project for the region addresses all National Disaster Recovery Framework sectors, which is in keeping with the State's holistic approach to disaster recovery; (iii) affords opportunity to revitalize through resilience measures; (iv) complements other remediation and national habitat restoration already underway in the region; (v) the types of flood risks faced in the area are similar to the risk faced in other inland, riverine and estuarine communities so lessons learned can be incorporated into the planning for regions across the State; (vi) NDRC presents an opportunity to expand upon the resiliency measures planned under the Meadowlands RBD project; and (vii) other than RBD, there are no currently proposed significant flood protection projects (e.g., an USACE project) that focus on the Meadowlands region.

Once DEP determined that the most viable resilience project should be constructed in the Meadowlands region, DEP used the Meadowlands RBD project proposal as a base concept. The towns in the proposed New Meadowlands service area were severely flooded during Superstorm Sandy. Those towns have no more flood protection today than they did before the storm so existing conditions pose a serious and immediate threat to the health or welfare of the communities within the service area. Although DEP did receive $150 million in funding from HUD to implement the New Meadowlands RBD project, based on the current budget, sufficient funding is not available to complete the resiliency vision fully protecting the Meadowlands towns. Our NDR proposal does not seek to duplicate what

has already been funded under RBD. Rather, it expands upon what is currently possible; protecting a larger area, adding additional flood prevention technologies and measures and tying these efforts to community revitalization. Leveraging the existing RBD funding will create a more durable, widespread reduction of flooding risk. Our NDR project not only ensures that the concept funded by HUD under RBD can be realized, but also fosters a more encompassing approach to resiliency.

DEP evaluated topographic elevations, areas that consistently flood and were flooded during Superstorm Sandy, existing man-made structures that may provide flood protection, property ownership, and probable project costs for areas proximal for potential NDR project locations and approaches. As a result of this analysis and as an expansion of the RBD concept, New Jersey proposes flood prevention based on a flood protection system within Bergen County, an Most Impacted and Distressed area. The flood prevention system will start at Route 80 at the Hackensack River and travel downstream (southerly) along the Hackensack River to Route 3 and then travel westerly along Route 3 for a distance of 1.8 miles up to approximately Route 17. This service area includes the municipalities of South Hackensack, Moonachie, Teterboro, Little Ferry, Carlstadt, portions of Hackensack, portion of Hasbrouck Heights, a portion of Woodridge and portions of Rutherford and East Rutherford.

Historically, the Hackensack Meadowlands area was developed as a supply resource for the NY metropolitan area, roughly 15 miles long by four miles across, with the western edge comprised of green suburban hills and an eastern ridge that grounds the NY skyline. The lowland between is a fragile estuarine ecosystem and critical part of the North American Flyway. It is crisscrossed with a variety of transportation routes, dotted with Superfund sites, and home to a patchwork quilt of commercial, light industrial and low-density residential developments. In a subtle but significant difference to being developed as a typical colonial port city, the Dutch influence in the area led to structural reclamation via dikes/drains, leaving reclaimed acreage below high tide level. It wasn't until the later 19th and 20th centuries that upland was created above the high tide level through in fill

projects. As a result, the project service area is generally 2.0-6.0 ft. above sea level and is susceptible to storm and tide flood events.

A critical factor in developing a flood mitigation project in an estuarine or riverine area is to preserve the natural flood storage and surge reduction functions, while accounting for risks associated with potential climate change and sea level rise. The backbone of the Meadowlands Resilience Revitalization Project component will be a berm and water management/pumping system. Based on consultation with the State Floodplain Manager, it is expected that the top elevation of our flood protection structure will be at approximately elevation 14. Additional work with FEMA will be required to determine with absolute certainty DEP's design elevation.

A large water control structure at Route 3 on Berry's Creek will be an integral part of the flood control system. This structure would not function as a simple tide gate which typically closes during the daily rising tides but would allow for discrete closings during storm events and at other beneficial times. Although this project will be innovative with its approach to comprehensive flood protection and public access, the centerpiece of innovation is its ability to restore, enhance and remediate existing wetlands and it is the water control structure at Route 3 on Berry's Creek that makes this possible.

The water control structure also provides options that could potentially assist in the remedy for the Berry's Creek Superfund site. Control of the Berry's Creek water will be useful for several reasons. DEP's primary concept for wetland enhancement involves temporarily impounding water to kill the Phragmites Australis. There is currently about 300 acres of Phragmites dominated wetland upstream of Route 3 on Berry's Creek. Phragmites is known as an invasive non-native plant species that tends to establish a mostly impenetrable monoculture with low ecological value. It is also known that under the right conditions that temporary flooding can kill phragmites. Once the phragmites has been killed, conditions would likely be suitable for the establishment of Spartina alternaflora or other beneficial native wetland plant species. Spartina wetland communities provide excellent habitat for wading

birds, waterfowl, forage fish and juvenile fish. In addition to the services that a Spartina wetland will provide, it will also produce additional opportunities (locations, species and quantity) for recreational and commercial fishing.

This water control structure may also provide options that could potentially assist in the remedy for the Berry's Creek Superfund site. USACE information indicates that the 120 acre Walden Marsh receives tidal influence from Berry's Creek. The site is predominately a common reed (Phragmites australis) monoculture, with highly contaminated soils. It's estimated that 20 tons of mercury exist in a stratified layer in the Walden Marsh soils. Controlled flooding may continue into Eight Day Swamp, further to the north. Eight Day Swamp is a highly contaminated wetland area on the western banks of Berry's Creek. High levels of mercury and other heavy metals are found throughout the site. An estimated 50 tons of mercury are found in a stratified layer within the marsh soils. The Eight Day Swamp is dominated by Phragmites and receives very little tidal flushing. Both Walden Marsh and the Eight Day Swamp are listed in the U.S. Fish & Wildlife Service "The Hackensack Meadowlands Initiative Primary Conservation Planning report of March 2007 (Figure 21, page 70) as being "Substantial Concern Sites."

In addition to vulnerability from storm surges, the service area floods regularly from fluvial or rain events. The project will be designed to reduce rainfall flooding by increasing drainage (cleaning and desnagging creeks and ditches), installing new stormwater conveyance infrastructure, installing pump stations and tide gates at strategic locations, and encouraging green infrastructure to reduce initial runoff.

Construction practices associated with berm construction (i.e. the trapezoidal cross section and dimensions) make this form of flood control suitable to double as a public access feature. This project concept provides public access points and will include one or more of the following improvements: boat launches, fishing piers, boardwalks, bike paths, bird blinds, walking trails and scenic overlooks.

These features will give the local residents and visitors an opportunity to enjoy the restored natural habitat. This new opportunity has the ability to increase the quality of life and property values for adjacent and nearby communities. Additional public access to the Hackensack River and its associated tributaries will also provide quicker access during emergencies for first responders.

Project 2: Increasing Transit Capacity

Currently, NJ TRANSIT primarily services the Meadowlands Service Areas by bus; those buses are serviced by a garage in Oradell, New Jersey (outside the Meadowlands region). To promote the revitalization of the project service area, NJ TRANSIT proposes to construct a new bus garage. The current constraints of the Oradell Bus Garage render NJ TRANSIT unable to accommodate projected additional ridership growth anticipated to be caused by a growth in housing and economic activity as the Meadowlands becomes a more attractive area for investment. The proposed project will increase service, better connecting residents of the Meadowlands communities to jobs, education, commercial, retail, and entertainment locations.

Through planning and regional analysis, NJ TRANSIT will identify a location for a new bus garage in the Meadowlands Service area. NJ TRANSIT would seek to maximize the impact of NDR funding by leveraging available local funding sources, including funding available through the NJ Meadowlands Regional Commission (NJMRC) and other funding available to NJ TRANSIT's Capital program. There are three key benefits to constructing a new bus garage:

Enhancement transit capacity: Oradell Bus Garage is filled to capacity with only 208 buses that are 40 feet in length. Replacing the undersized Oradell Bus Garage with a new bus garage within the Meadowlands Service area would greatly enhance bus mass transit capacity in the region. The proposed new bus garage could accommodate buses that are 45 feet in length. NJ TRANSIT estimates that the ability to add 45 foot buses could increase seating capacity in the region by 2,320 seats. The proposed new bus garage could either supplement the existing Oradell Bus Garage or entirely replace

the garage and accommodate an expanded number of buses –up to 92 buses more than the Oradell Bus Garage can accommodate – with the potential to add substantial seating capacity for the Meadowlands Service Areas' commuters and customers.

Improved resilience: The current Oradell Bus Garage is susceptible to the impact of extreme weather events due to flooding conditions caused by the Oradell Reservoir Dam. Since the flooding is not due to the natural rise of a stream, it cannot be predicted with certainty based on surrounding conditions. Therefore, NJ TRANSIT must often evacuate the facility of all buses and prepare for the possibility of a flood since the release of the reservoir provides only a 15 minute window from dry ground to 5 feet under water. As a result, NJ TRANSIT operates a flood contingency plan which includes leasing space from the Paramus Park Mall at significant expense and with impact to the agency's ability to continue to provide robust bus service in advance, and following, an extreme weather event. There is a threat of flood 4-6 times per year, during which garage managers move critical parts to higher shelving and the full 208-bus fleet to the leased facility resulting in significant overtime costs and additional deadhead mileage. This exercise costs NJ TRANSIT $387,000 per evacuation and impacts the agency's ability to provide reliable service to customers in the Meadowlands Service Areas and in other areas in Northern New Jersey. In addition to unpredictable flooding due to the release of water from the Oradell Reservoir, the Oradell Bus Garage has flooded 3 times due to storms during the last decade: the Nor'easter of 2007; Hurricane Floyd (1999); and Hurricane Irene (2011). During Hurricane Floyd in 1999, floodwater released from the Oradell Reservoir Dam inundated the Oradell Bus Garage resulting in more than $1 million in cleanup costs and included the loss of several buses, several private vehicles and the garage function for months. The construction of a new bus garage would contribute to more resilient service opportunities for NJ TRANSIT.

Environmental: A new bus garage could include compressed natural gas (CNG) fueling for buses and solar roof panels. This will reduce NJ TRANSIT's energy consumption and its carbon footprint diversifying and providing more resilient energy sources for the new bus garage. The expansion and improved provisioning of bus service in the Meadowlands Service Areas could fuel local economic activity by creating new jobs, attracting commerce and investment, and providing expanded access to employment opportunities to residents of the Service Areas. These potential opportunities could also contribute to NJ TRANSIT's system wide resilience – enhancing NJ TRANSIT's ability to better withstand, and recover from, extreme weather events by ensuring a robust platform to maintain bus service to the Meadowlands Service Areas and in other parts of Northern New Jersey.

Project 3: Resiliency Planning Grant Program & Toolkit

DEP will utilize its extensive existing planning tools, criteria, and processes to implement a Regional Resiliency Planning (RRP) Grant Program in the nine Sandy-impacted counties. The RRP Grant Program will provide funding to groups of municipalities (regions) to undergo a comprehensive planning process to identify and address vulnerabilities created by climate change. It will also support environmental resource protection, and promote sustainable/smart growth development. The RRP Grant Program will be implemented in two phases: Regional Planning and Planning Implementation.

The Regional Planning Phase: This phase will fund a comprehensive planning process that identifies vulnerabilities to hazards, evaluates multiple planning scenarios through a public stakeholder process, and develops a Regional Resilience Action Plan (RRAP) through a detailed cost-benefit analysis. The Planning Implementation phase will fund implementation of specific, regionally-significant, actions identified in the RRAP. These actions may include, but are not limited to, development of planning documents, ordinance adoption, and project design. The RRAP Grant Program will seek to fund six planning projects within multi-municipal regions, within the nine Sandy-impacted counties. DEP has identified six geographic Planning Areas within these nine counties

defined by unique geographic and social characteristics. These characteristics will determine the issues for consideration, types and severity of hazards, and selection of appropriate responses to identified vulnerabilities. Utilization of these Planning Areas will promote replicability of the planning projects, informing further efforts in these areas. The six Planning Areas are:

- Urbanized Northeast: Bergen, Hudson, Essex, Union, Middlesex, Monmouth (north shore) counties.
- Mainland Atlantic Coast: Monmouth Ocean
- Inland Suburban/Rural: Middlesex (western), Monmouth (inland), Ocean (northern);
- Coastal Bayfront: Ocean (southern), Atlantic
- Pinelands: areas within the NJ Pinelands region, parts of Ocean, Atlantic, Cape May;
- Cape May: Cape May.

DEP has, over the past several years, developed a comprehensive planning protocol, and a number of tools and guidance to assist in this process. This protocol will be provided in detail in the Notice of Funding Availability (NOFA), and will serve as the basis for all scopes of work. The NOFA will include a detailed description of tasks and process based on the Protocol and will include list of LMI communities. Each project proposal must include: at least three eligible municipalities with a shared boundary; demonstration of commitment; description of past disasters and/or demonstration of threat from future disasters using tools identified in NOFA (e.g. DEP CVI, vulnerability assessment, NOAA Sea Level Rise Viewer); and a detailed description of vulnerable communities located within the project area. DEP will select applicants based on:

- Ratio of LMI to non-LMI municipalities in the proposed project area (prioritization)
- Identification of vulnerable communities within the proposed project area
- Demonstrated support of vulnerable communities within the proposed project area
- Demonstration of commitment

- Demonstration of past/future disasters

Planning Implementation Phase: One outcome of the Regional Planning phase process is development of a RRAP that will identify specific actions to implement the community-selected planning scenario. Those actions may include, but are not limited to, development of municipal planning documents, development and adoption of ordinances, and identification of nature-based/green and grey infrastructure projects. Each of these projects will include an evaluation of the regional significance, impacts on LMI and vulnerable communities, and cost estimates for implementation.

***Resiliency Toolkit*:** DEP has developed tools to support the implementation of its comprehensive resiliency planning protocol. This Toolkit seeks to provide the necessary data, analysis, procedures, and best management practices to assist New Jersey communities understand their vulnerabilities to hazards intensified by climate change, and select and implement the actions to best address them. Many of these tools were developed for coastal communities and will require enhancement to address inland riverine hazards. There are three primary gaps in the existing Toolkit that the NDR grant will fund:

- Benefit-Cost Analysis: while the models and procedures of a BCA are known and in use, an easily accessible and repeatable process that addresses the extent of the planning protocol's requirements is still needed;
- Research and modeling to project non-tidal flooding resulting from climate change, including precipitation events of increasing frequency and intensity.
- Recap of the lessons learned and promising practices from the Meadowlands project.

4.2 Design Philosophy

In developing the NDR project, the State considered the needs of lower income households, minority populations, limited English-speaking proficiency households, single parent households, individuals with disabilities and elderly populations. Vulnerable populations are at direct and indirect

risk due to repetitive fluvial and storm surge flooding. Lacking adequate financial resources and social connections, these groups suffer a disproportionate initial impact and face a longer recovery period with diminished chances for success. Our project stakeholders also expressed concerns about potential job loss, risk to public works/infrastructure in the floodplain and sewage discharges into estuaries. Thus, one criterion used in selecting the NDR project as our pilot site was whether it would explicitly protect commercial facilities and corridors from future flooding, thus protecting jobs and increasing resiliency. Other criteria included reducing risks to sea level rise, storm surge, fluvial flooding, sewage releases, and contamination. The proposed berm and wetlands restoration provides flood protection to minimize these risks and vulnerabilities and improves the natural habitat.

4.3 Geographical Boundaries

Towns that directly benefit from the ***Revitalization through Regional Resilience*** project include Little Ferry, Carlstadt, Moonachie, Teterboro, Wood-ridge, Hasbrouck Heights and South Hackensack, Hackensack, Rutherford and East Rutherford. The project concept presented in this application expands on the RBD project and involves construction of a substantial flood protection barrier that will protect almost 6,000 acres of land and resources, enhancing wetlands, providing more publicly accessible open space and other attributes, and potentially aiding in the remediation of the Berry's Creek Superfund site.

4.4 Proposal Components

The proposed NDR project (the "Project") contains three central components:

1. **Expansion of Berm; Pumping Stations; Wetlands Restoration; Tide Gate (Flood Protection System).** The project will expand the proposed berm from the northwestern border of Little Ferry down to the eastern border of East Rutherford, and along the southern border of East Rutherford, and calls for additional pumping stations to address rainwater events as well as steps to begin addressing stormwater management. Enhanced flood protection will increase

property values and ultimately decrease insurance premiums. This increases owner's equity and reduces housing-related expenses. In addition to protecting critical infrastructure it will increase ratables, providing communities with additional property tax revenues. This leads to more stability in local governmental budgets and improves public service provision. Communities with stable or expanding tax bases and adequately funded schools, typically have appreciating housing values. This creates a positive cycle of economic revitalization through resilience.

In addition to the creation of parks and bike trails and wetlands restoration, a water control structure is proposed at the mouth of Berry's Creek along the southern border of East Rutherford. Controlling tides can enhance ongoing environmental remediation efforts and, in time, facilitate the replacement of invasive phragmites with spartina. This will provide a better environment for native species that have been shown to leech mercury out of water, providing considerable health benefits. (NDR Request: $236 million)

2. **NJ TRANSIT Satellite Bus Garage.** Community stabilization and economic revitalization is tied directly to access to employment opportunities. Building a bus garage in the Meadowlands Service areato address economic impacts from Sandy in the target communities and on NJ TRANSIT assets will expand bus and/or Meadowlink service in the target areas to critical job centers like New York City, Jersey City, Newark and the nearly 8,000 permanent jobs that will be created by the American Dream project in East Rutherford. More public transportation also will reduce congestion, one of the area's most significant economic challenges, and have ancillary health and environmental benefits by reducing vehicle emissions. (NDR Request: $75 million)
3. **Planning.** The State will work with university partners to develop a toolkit of lessons learned from implementation of this project that can then be incorporated by other communities facing

similar repetitive flooding issues. The last component of the NDR application therefore will seek funding for those communities to facilitate this regional planning initiative. (NDRC Request: $15 million).

4.5 Anticipated Changes to Local Policies

DEP adopted emergency amendments to New Jersey's Flood Hazard Area Contract Act rules establishing new statewide minimum elevation standards for construction and reconstruction of houses and buildings in areas at risk of flooding. The rule, adopted by emergency action on January 24, 2013, requires all new and reconstructed buildings to be elevated in accordance with the best available flood mapping. The Flood Hazard Area Control Act now requires the lowest floor of habitable buildings in flood hazard areas to be constructed at least one foot above the base flood elevation. In addition to the DEP's elevation standards, buildings in flood zones must meet increased Uniform Construction Code standards that are regulated by DCA and implemented at the local level. All local building officials have been trained on all new requirements and have implemented the new standards. In other actions, the Meadowlands communities have taken action to increase standards for construction, wetlands preservation, zoning, permeable surfaces, etc. Recommendations are being incorporated into land use, transportation, and hazard mitigation planning. The State is funding resiliency planning grants to local communities in the nine most impacted counties to enable them to incorporate these recommendations into their land use plans. To date 107 grants have been awarded totaling more than $1.6 million and 81 plans have been completed and are beginning implementation. To date, implementation has resulted in GIS system development, Master Plan reexamination, fiscal impact analysis, and permit and application process quality improvement at the municipal level.

4.6 Timeline

The project timeline for the construction of the Flood Protection System will follow the timeline developed for the Rebuild by Design funded portion of the project which includes a contract award for feasibility/design and construction oversight in mid-October 2015. Feasibility study completion will occur in the fall of 2017. The feasibility phase will include assembling and reviewing existing data and determining where there is insufficient or an absence of useable data as it relates to the existing concepts. Based on this review, plans to fill existing data gaps will be developed, approved and executed. The end stages of feasibility will result in a report that will recommend adjusting the concepts as dictated by studies and will also recommend how to best proceed with the design phase.

The preliminary timeline for the new bus facility for 90 additional buses includes three phases: planning/feasibility commencing in 2016 and concluding in 2017. The design and pre-development starting in 2018 and ending in 2019 and the site development beginning in 2020 and final construction completed in 2022.

4.7 Useful Life

The estimated life of the Meadowlands Resilience Revitalization project is 50 years; and the estimated life of the new bus garage is 40 years.

4.8 Alternative Discount Rates

In the analysis of the costs and benefits of the rule, all impacts are presented in constant dollars and summarize the overall effects using a discount rate of 7%. For comparison, an alternative discount rate of 3% is used following guidance from HUD and Office of Management and Budget (OMB).[6]

[6] U.S. Department of Housing and Urban Development, "National Disaster Resilience Competition (NDRC) Benefit Cost Analysis: Appendix H" (presentation slides).

5. Risks if Proposal is Not Implemented

5.1 Long-term Effects

The risk of inaction is considerable. The covered project is an investment in the future of the Meadowlands and is designed to help mitigate the catastrophic losses suffered from another Superstorm Sandy sized event and will reduce hazards caused by fluvial and estuarine flooding. The flooding damages from events similar to Superstorm Sandy will be largely prevented by the construction of the berm in the covered project. These avoided damages, and the associated methodology for calculating them, can be found in Table 4. It is these annual avoided damages that the covered project will prevent.

In the absence of the project, 5 years into the future, flooding would still be a major problem threatening the vast majority of both the pilot area and East Rutherford. Residential, commercial, and industrial properties would all be at risk of structural damage as well as, in the case of commercial properties, lost revenue. Additionally, floodwaters would continually threaten the Teterboro Airport, MetLife Stadium, and the newly completed American Dream Mall, causing days of closures and cancellations. Sea level rise will exacerbate this threat. See Table 4 for damages that would be prevented by the berm.

The expected damages out to 20 years, given the absence of the project, are similar to the 5 year projection. However, damages may be marginally higher given the likelihood that climate change will result in higher sea levels and, subsequently, in higher floodwaters.

In the BCA it is assumed that between 25 and 50 years into the future the risk of a 100- and 500-year flood event (a 9 foot and 11 foot flood respectively), doubles as a result of climate change. This change in risk rate likewise increases the damages expected from both a 100- and 500-year flood event in the study area. As catastrophic events increase, a downward spiral of investor worry and declining property values of land along the waterways may ensue. While the Meadowlands Resilience

Revitalization covered project is not expected to prevent all storm damage, or mitigate all risk, looking into the future and assessing the increasing damages of flooding due to climate change, the construction of the berm and other components of the project appear to be a worthwhile and necessary component to the long-term economic prosperity of the region.

5.2 Impact on the community

If this proposal is not implemented, the area will continue to be subject to frequent flooding, including damages to vulnerable and low income populations. In addition, economic revitalization of the area will be further delayed with each event, resulting in business closures, loss of jobs and reduction in tourism. Taken together, property damage, wage loss and loss of service industry jobs has significantly greater impact on low income and other vulnerable populations.

5.3 Additive Impacts

The proposed project is critical to the health and welfare of the communities in the Meadowlands. If the project is not completed, the communities within the service area will continue to face repetitive flooding and property loss. This is an issue due to the fact that 69% of households in the service area that applied for FEMA Individual Assistance indicated that they do not have homeowner's insurance and 90% did not have flood insurance. If the proposed project is not implemented, these vulnerable families will continue to be without flood insurance due to higher rates from lack of flood protection measures. This repetitive loss will hamper the economic development of the communities due to the continued risk of property damages, having a disproportionate impact on low income, the elderly and other vulnerable populations. In addition, the natural resources in the area will continue to be denigrated. Without the additional flood prevention measures, contamination will continue from Berry's Creek Superfund site. The invasive phragmites will continue to prevent native species in the surrounding wetlands and release mercury in the sediment.

Without the provision of additional transit options in the region, additional traffic congestion and the attendant air pollution will occur. Individuals that rely on public transit to get to jobs and health care will experience continuing hardship.

Without the development of toolkits and the planning grant program, the lessons learned and modeling that has been so successful in communities that experienced coastal flooding, will not be adapted to provide these same benefits to inland and riverine communities in the nine most impacted counties, and others throughout the State.

5.4 Impact in Areas of Concentrated Poverty

Based on the Rutgers Study analysis[7], Moonachie was one of two towns in New Jersey with the highest community hardship index score, and the only one not located in a coastal area. The Community Hardship Index rated town on the following variables: prevalence and extent of power outages, and extent of physical damage to residential, commercial and municipal property. Both Moonachie and Little Ferry had high Household Hardship Index score. Moonachie ranked 13th highest, and Little Ferry was 31st among all impacted New Jersey municipalities.

Moonachie and Little Ferry are both subject to repeated riverine flooding. This situation should be improved with the construction of the berm. These areas also have populations that are dependent on public transportation, and the proposed improvements in public transit will make them more resilient to disasters.

5.5 Cost of Future Disaster

The estimated costs that may be avoided if a disaster similar to Superstorm Sandy should strike again can be found in Table 4 below. The costs would be substantial both to Bergen County and the service area. The towns in the proposed service area were severely flooded during Superstorm Sandy.

[7] The Impact of Superstorm Sandy on New Jersey Towns and Households, Rutgers School of Public Affairs, Rutgers-Newark, Stephanie Hoopes Halpin, PhD.

Those towns have no more flood protection today than they did before the storm so existing and continued conditions would pose a serious and immediate threat to the health or welfare of these communities. If the proposal is not implemented, the service area will continue to be subject to frequent flooding, the economic revitalization of the area will be further delayed, resulting in business closures, loss of jobs and reduction in tourism. This would also affect property values and any interest in the further development of the service area.

Table 4: Estimation of avoided damages

Type of Loss	Bergen County	Service Area
FEMA residential property claims	$4,518,894	
NJIT/U of Mississippi Study June 2014 - Private loss/damage		$14,740,565
FEMA Project Worksheets Cat C - roads & bridges	$664,143	
FEMA Project Worksheets Cat D- water control facilities	$307,421	
FEMA Project Worksheets Cat. E- buildings & equipment	$10,121,550	
FEMA Project Worksheets Cat. F- utilities	$59,743,162	
FEMA Project Worksheets	$565,045	

Cat. G- parks, recreational facilities, other facilities		
SBA Disaster loans for businesses	$394,856,784	
Lost wages (Rutgers Study)	$75,506,325	$2,927,538
Total	**$546,283,324**	**$17,668,103**

6. Benefits and Costs

This section presents a discussion of the benefits and costs that will be created by the covered project. DEP has quantified and monetized the impacts of the project where feasible. The goal of this monetization effort is to assist HUD and citizens better understand the community development and economic revitalization benefits that the covered project is expected to generate. It presents two key metrics for the covered project: (1) the benefit-cost ratio (BCR), which is a numeric ratio that expresses the discounted overall benefits of a project relative to its discounted overall costs, and (2) the net present value (NPV), that is, the difference between the discounted benefits and discounted costs. Monetized benefits and costs are discounted to capture the time value of money: benefits and costs are worth more if they are experienced sooner. In general, the higher the BCR and the NPV for the useful life of the proposal, the higher the economic payoff of the covered project.

Approach to Quantification

Where feasible, DEP collected quantitative and monetary estimates for the expected impacts of the covered project. Where monetary estimates were not directly available due to data limitations, estimated quantitative impacts using a combination of credible and geography-specific quantitative data sources were used.

In some cases, DEP was unable to identify sufficiently applicable or credible quantitative data relevant to the covered project or service area. In those cases, quantitative assumptions and analyses (e.g., scaling factors) were used to estimate the impact on the proposed service area using estimates from nearby localities or recent quantitative studies on hazard mitigation. This approach of adapting estimates from existing studies to a new context (in this case, a new area) is called "benefit transfer" and is a method recognized in the Office of Management and Budget (OMB) Circular A-4 for obtaining desired monetary values. Special care is taken to identify original estimates with similar localities or community characteristics when adapting these values to a new area. Some quantitative impacts that were estimated during this monetization process were not sufficiently reliable for inclusion in the BCR. For example, the positive impacts of the covered project on tourism were estimated for the study area. Since tourism data is not available at the level of individual boroughs, tourism impacts were estimated by disaggregating from Bergen County or New Jersey values. During this disaggregation process, it was not possible to account for tourism hotspots and instead an equal distribution of tourism impacts across the study area was used. While the tourism impact estimate is a defensible approximation, it is only an approximation and not of the same data quality as the rest of the BCR parameter inputs. For impacts such as these, quantitative results are presented and their exclusion from the BCR calculation noted. This exclusion process ensures that the BCR of the project is calculated rigorously while avoiding under-estimating the costs of the project. Finally, some impacts that were identified simply do not occur with sufficient frequency to yield reliable quantitative results. In such cases, anecdotal data was used to inform analysis, such as data based on Superstorm Sandy. While the anecdotal data is informative from an analytical standpoint regarding the directionality or the impact, they are excluded from the BCR calculation for two primary reasons. First, in order to reliably use that data, it would be necessary to disentangle flood-related damages from non-flood-related damages because the covered project will only prevent the former. This disaggregation is simply not

possible for most estimates due to data limitations. Second, it is analytically tenuous to rely on damage data from Superstorm Sandy as input parameter estimates in the BCR because it was a singular event. For impacts such as these, a qualitative discussion and anecdotal evidence is presented, if available, noting the directionality of the resulting impact based on economic theory. These analytical guiding principles are based on guidance from OMB Circular A-4, which outlines best-practices for Federal agencies in the development of benefit-cost analyses.[8]

FEMA BCA Tool Overview

The Federal Emergency Management Agency (FEMA) maintains a BCA tool for use in conducting benefit-cost analyses for applications submitted under FEMA's Hazard Mitigation Assistance (HMA) Grant Programs. The tool contains methods for estimating benefits of the most common benefit categories for buildings (e.g., building damage, displacement, and loss of function), utilities (e.g., electricity, water supply, and waste water treatment), and services (e.g., fire services, police services). The FEMA BCA tool comprises several modules to estimate expected damages from natural disasters, such as floods, hurricanes, tornados, and earthquakes, among others. In this case, the tool's Damage-Frequency-Assessment (DFA) module is used to estimate the benefits resulting from reduction in flooding due to the covered project. This module is commonly used to estimate the benefits of large-scale hazard mitigation projects. Unlike the Flood module in the FEMA BCA tool, the DFA module does not require detailed data requirements for each individual structure in the geographic area protected by the hazard mitigation project.

The FEMA BCA tool is used to estimate several benefits of the covered project. Using the difference in recurrence intervals—which the FEMA BCA tool uses as proxies for annual risk rates for a 100- or 500-year flood before and after construction of the project—the expected annual avoided

[8] Source: https://www.whitehouse.gov/sites/default/files/omb/assets/regulatory_matters_pdf/a-4.pdf (accessed on August 26, 2015).

damages is calculated to determine the annual benefits of the project. Specifically, the following benefits of the project are estimated: avoided residential damages (i.e., avoided structural damage and avoided resident displacement), avoided commercial damages (i.e., avoided structural damage and avoided loss of revenue), avoided utility damages (i.e., electrical, and potable and waste water), and avoided municipal damages (i.e., loss of police and fire services). The FEMA BCA tool is used to estimate the benefits from avoided damages to the Teterboro Airport due to future flood events. The calculation of these impacts is discussed in more detail in the "Economic Analysis" section below.

A collaboration of the Massachusetts Institute of Technology (MIT)'s Center for Advanced Urbanism and Dutch Delta Collective conducted the Rebuild by Design study in 2014 for the New Meadowlands redevelopment project.[9] That project featured many hazard mitigation elements similar to those in this proposed project. That project, however, covered a geographic area of the following boroughs: Teterboro, Little Ferry, Moonachie, South Hackensack, and Carlstadt. In this study, these boroughs collectively referred to as "the pilot area." This project covers the same boroughs as in the pilot area but also includes the Borough of East Rutherford. In this study, the total area protected by the proposed hazard mitigation project is referred to as "the protected area."

For this analysis, publicly available damage estimates are used for 100- and 500-year floods for the pilot area. Analogous estimates for the additional protected area (i.e., East Rutherford), however, are not publicly available. Instead, a scaling approach is applied to estimate the damages to East Rutherford using damage estimates for the pilot area. To estimate the damages for East Rutherford, the pilot area damage estimates are converted to damage-per-area parameters (i.e., dollars per acre) and those parameters multiplied by the total acreage—by land use type—in East Rutherford. For example, residential structure damages from the pilot area are converted to residential-damages-per-acre terms

[9] Source: http://www.rebuildbydesign.org/wordpress/wp-content/uploads/briefing/MIT__IP_Briefing_Book.pdf (accessed on August 14, 2015).

using the total acreage of residential land from land use and zoning data. Next, the residential-damages-per-acre parameter estimate is multiplied by the total residential acreage in East Rutherford to estimate the residential damage in East Rutherford. The two estimates and summed to calculate the total residential structure damage across the entire protected area. An analogous approach is used to calculate a per-acre estimate for the pilot area which is then multiplied by total commercial land in East Rutherford—to estimate expected lost commercial revenue. To estimate commercial structural damages for East Rutherford, an aggregate estimate of commercial and industrial structural damages from the pilot area is converted to commercial-industrial-damages-per-acre terms using the total acreage of industrial and commercial land from land use and zoning data. The commercial-industrial-damages-per-acre parameter estimate is multiplied by the total acreage of industrial and commercial land in East Rutherford to estimate structural damages in East Rutherford. The two estimates are summed to calculate the total commercial and industrial structure damage across the entire protected area.

Baseline and Analytical Timeframe

DEP derives its estimates by comparing the baseline—that is, the benefits and costs *without* the construction of the proposed hazard mitigation project—against the benefits and costs associated with the construction of the covered project. Example costs of the covered project include berm construction costs and maintenance costs, while example benefits include structural damages to residential housing units that are avoided due to the protection provided by the proposed berm.

The analysis covers 50 years (2016 through 2065) to ensure it captures all major costs and benefits expected to accrue over the useful life of the proposal.[10] When summarizing the benefits and costs of

[10] For the purposes of the benefit-cost analysis, the 50-year period starts on January 1, 2016.

the covered project, DEP presents 50-year averages to estimate the typical annual effects or 50-year discounted totals to summarize the present value of the overall effects. All impacts are presented in constant dollars and summarize the overall effects using a discount rate of 7%. An alternative discount rate of 3% is also used pursuant to guidance from HUD and OMB.[11]

Economic Analysis

The analysis below evaluates the following potential impacts of the covered project: construction and maintenance costs; avoided residential, commercial, utility, and municipal damages; avoided stadium and airport loss of function; wetland construction costs and associated benefits of new wetland areas; recreation and health benefits; tourism benefits; property value and tax revenue increases; and insurance premium changes.

In some cases, monetization of the impact is not possible due to data limitations. In such cases, DEP presents quantitative estimates of the potential impact where reasonable quantitative parameters are available. If quantitative factors are not available, anecdotal evidence is presented, if available, and a qualitative description of the potential outcomes and their directionality. The following impacts are included in the calculation of the BCR: lifecycle costs that include the cost to construct the berm and the recreation band, the maintenance cost of the berm, the construction of a new bus garage and route, the maintenance of bus transit garage and route, the land acquisition cost, and the wetland construction and mitigation cost; resiliency benefits that include avoided residential and commercial structural damage, avoided commercial lost revenue, avoided fatalities, avoided displacement, and avoided utility and municipal damages; environmental value, which includes the benefits of newly construction wetlands; and social value, including the recreational and health benefits of newly constructed parks along the recreation band.

[11] U.S. Department of Housing and Urban Development, "National Disaster Resilience Competition (NDRC) Benefit Cost Analysis: Appendix H" (presentation slides).

The sections that follow present the analysis results of our estimates of the covered project's lifecycle costs along with metrics related: Resiliency Value, Environmental Value, Social Value, and Economic Revitalization.

6.1 Lifecycle Costs

The lifecycle costs of the covered project include berm construction costs, bus transit construction costs, recreation area construction costs, land acquisition and easement costs, berm and bus transit operation and maintenance costs, and wetland mitigation costs. A DEP project manager estimated the total construction cost of the project for the protected area to be $386.4 million (not including the NJ TRANSIT project). This estimate includes $173.2 million in berm construction costs ($121.2 million to construct 5.74 miles of berm in the pilot area; $52.0 million to construct 2.46 miles of berm in East Rutherford). Also included in this total is the cost of administration oversight ($84.2 million) of the construction and contingency value ($47.7 million) to account for uncertainty in cost estimates. The cost to construct a recreation band along the length of the berm that includes a bike path, boat access ramps, and landscaping features. The total cost of the recreation zone is estimated to be $27.2 million ($19.1 million for the pilot area; $8.2 million for East Rutherford). Land acquisition cost is estimated to be $25.0 million ($17.5 million for the pilot area; $7.5 million for East Rutherford). The covered project includes the construction of a new bus transit garage and route. NJ TRANSIT estimates the cost of construction of the facility to be $75 million. Operation and maintenance of the facility is estimated to be $0.9 million per year.[12] Voluntary easements for the berm are assumed, implying that there is no monetary transaction taking place to account for homeowner inconvenience or property use restrictions. Negotiations with landowners over easements may result in additional costs or realignment of the berm and associated public access and ecological restorations or other government

[12] The construction, operation and maintenance costs for the bus transit portion are from NJ Transit.

measures to ensure access to the properties. The annual cost of berm operation and maintenance is estimated to be $0.5 million ($0.36 million for the pilot area; $0.15 million for East Rutherford).

Although every effort will be made to avoid impacts to the wetlands, during the construction of the covered project, some wetland area will be disturbed or destroyed. To mitigate this impact, replacement wetlands will be constructed. DEP estimates the cost of the wetlands mitigation by multiplying the total amount of wetland acreage to be mitigated by the construction cost of an acre of wetland. The total cost of wetland mitigation is estimated to be $29.1 million ($20.4 million for the pilot area; $8.7 million for East Rutherford).

In total, these lifecycle costs amount to an average annual cost of $10.65 million over the 50-year analysis time period. Applying a discount rate of 7%, we estimate the total discounted impact to be $467.3 million over the lifetime of the covered project.

6.2 Resiliency Value

Damages caused by Superstorm Sandy placed an immense strain on Bergen County and on the State of New Jersey as a whole. The New Jersey Governor's Office estimated a total cost of $35 billion in direct damages from Superstorm Sandy.[13] Damages to Bergen County alone were estimated at $29 million.[14] In New Jersey, residents filed 70,787 National Flood Insurance Program (NFIP) claims due to damages caused by Superstorm Sandy, totaling approximately $3.1 billion.[15] This underestimates

[13] Mantell, Nancy, et. al. (2013). The Economic and Fiscal Impacts of Hurricane Sandy in New Jersey: A Macroeconomic Analysis. *Rutgers*, 34, pgs. 1-16. Available at: https://rucore.libraries.rutgers.edu/rutgers-lib/43467/PDF/1/

[14] U.S. Department of Commerce. (2013). Economic Impact of Hurricane Sandy. Available at: http://www.esa.doc.gov/sites/default/files/sandyfinal101713.pdf

[15] Huffington Post. Hurricane Sandy's Impact, by the Numbers. (2013). Available at: http://www.huffingtonpost.com/2013/10/29/hurricane-sandy-impact-infographic_n_4171243.html

total damage as 69% of low and moderate income households did not carry homeowners insurance, and 90% had no flood insurance. [16]Small businesses were also adversely impacted. Superstorm Sandy caused nearly 19,000 small businesses to sustain damages totaling $250,000 or more, resulting in $8.3 billion in total losses to New Jersey businesses (1% of the State's 2012 GDP). Further, of the small businesses that were forced to close following the hurricane, more than 80% were closed for up to two weeks.[17]

In Bergen County alone, estimated lost wages as a result of Superstorm Sandy were valued at more than $75.5 million.[18] It is clear that the effects of Superstorm Sandy were widespread and the damages colossal. The covered project is expected to increase resiliency, protecting the region from future and repeat disasters such as Superstorm Sandy. The project will also reduce the damages from repeated riverine flooding.

The construction of a14-foot berm will have a positive effect on the resiliency of the protected area to future catastrophic flooding events. The covered project will prevent both 100- and 500-year flood waters from inundating the area, which FEMA assumes will have total flood heights of 9 feet and 11 feet, respectively.[19] The berm will prevent the inundation of flood waters into the protected area,

[16] Hoopes Halpin, Stephanie, "The Impact of Superstorm Sandy on New Jersey Towns and Households," Rutgers School of Public Affairs and Administration, 2013.

[17] U.S. Department of Commerce. (2013). Economic Impact of Hurricane Sandy. Available at: http://www.esa.doc.gov/sites/default/files/sandyfinal101713.pdf

[18] Halpin, S. (2013). The impact of Superstorm Sandy on New Jersey towns and households Rutgers School of Public Affairs and Administration. Available online at: http://njdatabank.newark.rutgers.edu/sites/default/files/files/RutgersSandyImpact-FINAL-25Oct13.pdf

[19] DEP assumes that the 100-year flood level will be a total of 9 feet, which includes an 8-foot storm surge with 1-foot waves. It is assumed that the 500-year flood level will be a total of 11 feet, which

reducing risk and cost of property and commercial damages, fatalities, displacement of residents, and damages to energy and water infrastructure. To estimate avoided property and commercial damages, the scaling approach discussed previously is followed. The values for the pilot are converted to damage-value-per-acre parameter estimates and multiplied by total residential and commercial acreages using land use and zoning data. Residential displacement is estimated by multiplying the area population from the U.S. Census (2010) by the percent of Bergen County subject to a 100- year and 500-year flood event.[20] Total displacement is calculated by multiplying the number of persons displaced by the number of days of displacement estimated by FEMA, which vary based on the depth of the flood waters, and then by per diem lodging and food rates.[21,22]

Summarily, DEP estimates the avoided residential and commercial damages—which represent avoided structural damages, avoided residential displacement, and avoided commercial loss of function to average $63.9 million per year over the 50-year analysis time period ($47.0 million in the pilot area;

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includes a 10-foot storm surge with 1-foot waves. Source: http://www.rebuildbydesign.org/wordpress/wp-content/uploads/briefing/MIT__IP_Briefing_Book.pdf (accessed on August 14, 2015).

[20] The Bergen County Jurisdiction Mitigation Plan contains information the percent of each municipality inundated by a 100-yearr and 500-year flood. This percent is multiplied by the area population to obtain an estimate for the number of persons displaced by floodwaters.

[21] Displacement days are calculated using the FEMA Depth Damage Function which vary based on the height of the flood waters. A 9-ft flood results in 405, while an 11-ft flood results in 495 displacement days.

[22] Per Diem lodging and food rates are from the U.S. General Services Administration and are specific to Bergen County. Source: http://www.gsa.gov/portal/content/104877

$17.0 million in East Rutherford). Applying a discount rate of 7%, the total discounted impact is estimated to be $643.1 million over the lifetime of the project.

Reduced flood water inundation will also yield benefits in the form of avoided fatalities across the protected area. DEP estimates the impact of avoided fatalities by multiplying the total number of flood-related fatalities from Superstorm Sandy by the FEMA-suggested value of a statistical life.[23,24] Multiplying resulting value by the 100- and 500-year flood risk rates it is possible to estimate the annual benefit of avoided loss of human lives. This yields an annual value of the reduction in expected fatalities to be $0.180 million per year over the 50-year analysis time period ($0.009 million in both the pilot area and East Rutherford). Applying a discount rate of 7%, the total discounted impact is estimated to be $1.83 million over the lifetime of the project.

The construction of the berm will also yield benefits in avoided damages and outages to local utilities, including electricity, water supply, and waste water treatment. With flood waters not breaching the berm, these services should remain largely undamaged. To estimate this impact, the populations of the inundated areas along with the 100- and 500-year flood risk rates are used as input parameters into the FEMA BCA tool. The annual reduction in utility damages is estimated to be $0.859 million ($0.445 million in the pilot area; $0.414 million in East Rutherford). Applying a

[23] According to a New York Times article, there was 1 fatality in Bergen County during Hurricane Sandy caused by flooding. Source: http://www.nytimes.com/2012/11/18/nyregion/hurricane-sandys-deadly-toll.html?_r=0

[24] DEP assumes the value of a statistical life to be $5.8 million (in 2012 dollar terms) from the Federal Aviation Administration. It is converted to 2014 dollar terms using the Consumer Price Index. Source: https://www.faa.gov/regulations_policies/policy_guidance/benefit_cost/media/Revised%20Value%20Of%20Life%20Guidance%20Feburary%202008.pdf

discount rate of 7%, the total discounted impact is estimated to be $7.7 million over the lifetime of the project.

The Meadowlands Resilience Revitalization covered project will also prevent the loss of function of municipal services as well as avoided lost revenues of the Teterboro Airport, MetLife Stadium, and the American Dream Meadowlands Mall. To estimate the loss of function of municipal services, DEP uses the annual budgets for the municipal services at risk as an input into the FEMA BCA tool. The annual avoided lost value of municipal services is estimated to be $594 million ($585 million in the pilot area; $8 million in East Rutherford). Applying a discount rate of 7%, the total discounted impact will be $6,369 million over the lifetime of the project.

To estimate the avoided lost revenues of the Teterboro Airport, DEP uses the annual budget of the airport as an input into the FEMA BCA tool and assumes a three-day shutdown of the airport during a 100- and 500-year flood.[25] The annual avoided lost revenues at the Teterboro Airport are estimated at $0.667 million. Applying a discount rate of 7%, the total discounted impact is $6.8 million over the lifetime of the project.

To estimate the avoided lost revenues of MetLife Stadium, the annual budget of the stadium is used as an input the FEMA BCA tool and a three-day shutdown of the stadium during a 100- and 500-year flood is assumed.[26] The annual avoided lost revenue at MetLife Stadium becomes $0.022 million.

[25] The annual budget for the Teterboro Airport is from a report from 2012 by the Port Authority of New York and New Jersey. Source: https://www.panynj.gov/airports/pdf-traffic/ATR2012.pdf.

[26] MetLife Stadium revenues are from a news story on the MetLife Stadium website. The estimate does not include lost revenue from football games, only from other events and should be considered a conservative estimate that seeks to avoid over-estimating the benefits of the covered project. Source: http://www.metlifestadium.com/news/2015/01/06/metlife-stadium-named-billboard-s-top-grossing-stadium-in-the-world.

Applying a discount rate of 7%, the total discounted impact is $0.225 million over the lifetime of the project.

The American Dream Meadowlands Mall is expected to partially open in 2016 with full occupancy by the summer of 2017.[27] As benefits of the covered project will not begin to accrue until after the two-year construction phase, DEP expects the mall will be completed at approximately the same time benefits begin to accrue. To estimate the avoided lost revenues of the mall, commercial revenue damages resulting from a 100- and 500-year flood in the pilot area are converted to commercial-revenue-lost-per-acre by dividing by total commercial land in the pilot area using land use and zoning data. This commercial-revenue-lost-per-acre parameter from the pilot area is applied to the New Meadowlands Mall. To do this the commercial-revenue-lost-per-acre from the pilot area is multiplied by the estimated size of the completed mall. [28] The resulting values are estimates for lost revenue of the Mall during a 100- and 500-year flood. DEP estimates annual avoided American Dream Mall loss of function values by multiplying these values by the 100- and 500-year annual risk rate. The annual avoided lost revenue at American Dream Mall is estimated to be $2.4 million. Applying a discount rate of 7%, the total discounted impact is $32.7 million over the lifetime of the project.

Finally, the covered project is expected to prevent cleanup costs incurred when floodwaters wash through carrying debris. The berm will prevent these floodwaters from inundating the area and

[27] Joan Verdon (2014). Retail Giants Lining Up, American Dream Says. North Jersey.com. Available at: http://www.northjersey.com/news/retail-giants-lining-up-american-dream-says-1.1148277?page=all

[28] Estimated revenue loss only includes commercial space and does not include lost tourism revenue expected from a proposed water and amusement park. For this reason, expected avoided damages to the American Dream Mall should be viewed as a conservative estimate that seeks to avoid over-estimating the benefits of the covered project. Source: http://www.northjersey.com/news/american-dream-meadowlands-to-finally-get-exterior-makeover-video-1.1057560

therefore debris removal costs will be avoided. DEP uses an estimated avoided debris removal cost from the MIT-Rebuild by Design project. The annual avoided cost of debris removal is estimated to be $0.12 million. Applying a discount rate of 7%, the total discounted impact is $2.69 million over the lifetime of the project.

In total, the covered project will yield avoided property and commercial damages, avoided fatalities, avoided displacement of residents, avoided damages to energy and water infrastructure, avoided damages to the Teterboro airport, MetLife stadium, and the American Dream mall, and avoided debris removal costs due to future flood events. This amounts to an average annual resiliency value of $68.2 million over the 50-year analysis time period. Applying a discount rate of 7%, the total discounted resiliency value is estimated to be $693. 6 million over the lifetime of the project.

6.3 Environmental Value

The construction of the berm will have varying impacts on the environmental value of the surrounding area. During the construction phase, there will be intermittent wetland construction efforts, including the drainage and paving of wetlands in the direct path of the covered project, and the creation of new wetlands to mitigate the acres lost to construction of the project. Upon completion, these wetlands will provide ecosystem benefits to the surrounding areas, including positive impacts on air quality, stormwater runoff control, waste treatment, and natural habitat and biodiversity

The enhanced wetlands areas will improve air quality and have a positive impact on climate change by absorbing harmful pollutants and carbon from the atmosphere, which are then stored in the plant biomass or the surrounding soil. Additionally, wetlands help contain stormwater runoff and reduce flooding during rain events by trapping water. Wetlands also provide waste treatment services by removing nitrogen and phosphorous from waterways and storing these nutrients, which helps prevent detrimental effects to waterways, such as algal blooms. Finally, the wetlands will provide prime habitat for a variety of species. This habitat not only benefits the species that make the wetlands a habitat, but

it will also serve as a cultural and recreational amenity for the surrounding community. To estimate the impacts of the wetland areas, DEP multiplies the acreage of wetlands being constructed by the annual benefits of an acre of wetlands.[29] The annual benefit of the wetlands, and thereby the environmental value of the covered project, is estimated to be $0.76 million ($0.53 million in the pilot area; $0.23 million in East Rutherford). Applying a discount rate of 7%, the total discounted impact is $9.78 million over the lifetime of the project.

The covered project is expected to have a negligible impact on energy use, noise levels, and the urban heat-island effect.

6.4 Social Value

The construction of the proposed berm will have various impacts on social value in the surrounding area. The covered project will positively affect the community by reducing risks to human life, property damage, and displacement that occur with flood events. The covered project will reduce community and household hardships caused by storm damage and repeated flooding. In Moonachie and Little Ferry, for example, 25% of residents whose homes were damaged during Superstorm Sandy still experience emotional distress even three years after the storm, and one in eight residents exhibit signs of post-traumatic stress disorder.[30] This emotional strain results in an estimated treatment cost of $2.1 million per year, and $7.4 million in estimated lost productivity. These monetary values are estimated by multiplying the population of the covered project area by the percentages above of

[29] State of New Jersey, New Jersey Department of Environmental Protection (2007). Valuing New Jersey's Natural Capital: An Assessment of the Economic Value of the States Natural Resources. Available at: http://www.state.nj.us/dep/dsr/naturalcap/nat-cap-1.pdf

[30] Washburn, Lindy (2015). NJ 'still in recovery' from Superstorm Sandy's mental health issues. NorthJersey.com. Available at: http://www.northjersey.com/news/lingering-effects-of-sandy-have-taken-a-mental-health-toll-study-finds-1.1382558

residents whose homes were damaged, and multiplied further by the monetary estimates per person for treatment cost and lost productivity from the U.S. Department of Housing and Urban Development.[31] While the berm is not expected to mitigate widespread hurricane destruction, reduced flood damage will alleviate some human suffering caused by repetitive flooding and catastrophic environmental events.

The benefits to low- and moderate-income persons and households are difficult to quantify. The proposed project will serve an LMI population that comprises 41.78% of the total population (see Exhibit B for a more detailed discussion of the LMI population) of the service area. The benefits of the covered project will apply directly to those who live in the immediate area and will positively impact LMI households in the region. DEP also expects housing prices to increase as a result of lower flood risks and the addition of the natural amenity created by the restored wetlands and the recreation band along the length of the berm. Homebuyers as well as lenders, place a higher value on homes in areas of reduced flood risk. This should result in increases in local property values. According to the Trust for Public Land (2009), properties adjacent to parks increase in value to the order of 5% due to the amenity value of the parks.[32]

Similarly, the health benefits of the new recreational zones will directly apply to all residents in the area, including LMI households. The recreational benefit, including a per-user health and visitor recreational benefit, is estimated by multiplying the population in each area by per-person estimates of

[31] U.S. Department of Housing and Urban Development, "National Disaster Resilience Competition (NDRC) Benefit Cost Analysis: Appendix H" (presentation slides).

[32] Trust for Public Land Report (2009). Measuring the Economic Value of a City Park System. Available at: http://cloud.tpl.org/pubs/ccpe-econvalueparks-rpt.pdf

the monetary value of health and recreation benefits.[33] This yields an average annual benefit of $7.1 million. Applying a discount rate of 7%, we estimate the total discounted impact to be $95.2 million over the lifetime of the project. What fraction of this estimate applies directly to LMI persons and households is unclear; nevertheless, the benefits should be widely distributed across the resident population.

The effect of the covered project on housing affordability is also uncertain. The covered project will revitalize the area reducing the risk of flooding, which should increase housing values and rents as consumer confidence in the area increases. Decreases in the risk of flooding will over time reduce property and flood insurance premiums, making home ownership more affordable. As a direct result of Superstorm Sandy, for example, insurance premium rates increased. Single-family homes and condo units saw an additional annual surcharge of $25, and multi-family homes and non-residential buildings saw an additional annual surcharge $250.[34] Due to the uncertainty in the resulting directionality of the impact on housing affordability, it is not considered in the calculation of the BCR.

6.5 Economic Revitalization

Economic revitalization is the process of transformative growth and economic development in a region. Revitalization can materialize in many ways, including the construction of new residential, commercial, or industrial buildings, the development or re-development of neighborhoods and districts, or as renewed investor confidence in historically risk-prone areas. For the covered project area, where Superstorm Sandy caused catastrophic damage in terms of structural damage and human

[33] Per-user health and recreational benefits are from the Trust for Public Land Report (2009). Available at: http://cloud.tpl.org/pubs/ccpe-econvalueparks-rpt.pdf

[34] NJ Spotlight (2015). Jersey Shore Homeowners Cry Foul Over New Fees Added to Insurance Premiums. Available at http://www.njspotlight.com/stories/15/04/02/shore-homeowners-cry-foul-over-new-fees-added-to-insurance-premiums/

suffering, the benefits of the project will be substantial. The direct avoided physical damages to structures and property as well as the prevented anguish from displacement and physical casualties are obvious benefits, but many benefits are indirect or not immediately apparent. Impacts on tourism, residential and commercial property values, tax revenues, and insurance premiums, for example, are important components that contribute to the economic revitalization of the region protected by the berm. This section presents a discussion of those potential benefits.

Tourism: The impact of Superstorm Sandy on tourism in the State of New Jersey was substantial. The U.S. Department of Commerce estimated that in the third quarter of 2013 alone, New Jersey lost approximately $950 million in direct tourism spending.[35] These damages were distributed across the sub-sectors of the tourism industry. Decreases in spending were felt across various industries, including: accommodations ($287.2 million), food services and drinking places ($217 million), retail ($46.8 million), recreation ($106.5 million), air transportation ($30.1 million), and other transportation and support activities ($141.0 million). When impacts throughout the region were incorporated, the total impact for New Jersey in 2013 due to lost tourism revenue was $1.2 billion. These foregone revenues amount to an estimated 11,300 direct, indirect, and induced job losses in the New Jersey Travel and Tourism sectors. Low and moderate income households were particularly impacted, as many of the local residents are employed in service industry jobs that are directly or indirectly reliant on tourism.

DEP estimates the avoided damages to tourism due to the covered project based on the tourism estimates for Bergen County. The total annual value of tourism in the proposed service area is estimated to be $122 million. While it is unclear the extent to which the covered project would directly protect the tourism industry, the effects could be substantial as demonstrated by Superstorm Sandy.

[35] U.S. Department of Commerce (2013). Economic Impact of Hurricane Sandy. Available at: http://www.esa.doc.gov/sites/default/files/sandyfinal101713.pdf

Beyond current tourism estimates, the completion of the American Dream Mall is expected to increase tourism in the area. The 66-acre complex will support its own water and theme park as well as an indoor ski slope. With space for over 400 vendors and restaurants, the mall is expected to become a major regional tourism draw. The berm will protect this new retail space and prevent closures to the mall and the surrounding area. This added protection will likely increase investor confidence and boost interest in reserving retail space. Through the avoided damages to the American Dream Mall, the neighboring MetLife Stadium, and the additional avoided lost tourism revenue, the berm's is expected to positively impact economic revitalization.

Property Values: The covered project in the New Meadowlands will positively impact property values; the result of flood risk reduction coupled with new natural and recreational amenities. DEP estimates the increase in property values due to the recreation band by first estimating the acreage of land next to the berm using the defined length of the berm and a buffer value outlined by Trust for Public Land (2009) for areas that will see an increase due to distance from recreation zones. The per acre value of property is estimated by dividing total property values in the study area by total acres. By subsequently multiplying the acreage of properties next to the berm by the per-acre-property values property value estimates are obtained for the areas next to the berm. Property value increases due to the recreation band are estimated by multiplying the property value increases by the estimated percent increase in property values based on the Trust for Public Land (2009). An analogous approach is used to estimate increases due to reduced flood risk, whereby increases are estimated by multiplying total property values in the project area by the estimated percent increase. Across the entire study area, DEP estimates property values will increase by $546.3 million as a result of the reduced risk and the recreation band. This increase will result in increased tax revenues, described below.

Separately, the covered project will prevent decreases in property values due to storm damage. After Superstorm Sandy, the price of properties near the coast dropped considerably. Over time, the

volatility of price fluctuations settled, but the average property value in coastal New Jersey still declined by approximately 2%.[36] Future storms and flooding in the region may result in additional decreases in property values in the absence of the berm.

The protection of properties by the berm in the study area will reassure home and business owners as well as potential investors. The knowledge that investments in property or new construction sites will be protected from future catastrophic flooding events will likely catalyze economic revitalization in the region.

Tax Revenues: The covered project will not only reduce the risk of flooding but will add a recreation band; both of these attributes are expected to increase property values and tax revenues. Through increased tax revenues, municipalities have higher budgets and can provide a broader array of services, thus creating stronger and more attractive communities. The combination of property values and tax revenues can create a positive feedback loop where municipalities with higher budgets have the opportunity to continually improve the community and thereby increase the attractiveness of the area.[37] The benefits of the covered project in regards to tax revenue will likely encourage further investment in these communities and enhance the revitalization of the surrounding area. DEP estimates the increase in tax revenue by multiplying increase in property values due to the covered project by local property tax percentages. Across the entire study area, annual property taxes are estimated to increase by $17.6 million ($10.7 million in the pilot area; $6.9 million in East Rutherford) as a result of the reduced risk and the recreation band.

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[36] Catalin (2013). Asking Prices in Coastal NY and NJ Areas see No Post-Sandy Reduction. Point2Homes. Available at: http://www.point2homes.com/news/us-real-estate-news/asking-prices-coastal-ny-nj-areas-post-sandy-reduction.html

[37] Another possible but less likely scenario is that municipalities could decrease their tax rates to make their communities more attractive to businesses.

Insurance Premiums: As a direct result of Superstorm Sandy, insurance premium rates increased. Single-family homes and condo units experienced an additional surcharge of $25, while multi-family homes and non-residential buildings experienced an analogous surcharge of $250.[38] The construction of the berm will reduce the risk of a 100- and 500-year flood event, which will reduce insurance premiums. This decrease will result in higher disposable incomes of households in the areas protected by the berm, and this in turn will result in increased economic activity in the area.

Qualitative Discussion

As discussed previously, in some cases quantification or monetization of benefits is impossible. In this section a qualitative discussion of the benefits of the covered project is presented for factors that it was not possible to appropriately quantify or monetize. Many of these benefits may result in huge positive impacts to the study area, and the inability to monetize these factors should not result in these benefits being ignored or diminished. Rather, the inclusion of the factors in this section should reinforce that the benefits it was possible to monetize are conservative estimate for the true total value of the covered project.

Bus Transit: The benefits of the new bus transit component the Meadowlands Service area will likely have positive ramifications for the surrounding communities. While it is possible to estimate the construction and annual maintenance costs of the bus transit component, the benefits are more difficult to value. This construction will increase the number of buses in the area, and will result in: increased rider capacity, increased transit frequency, broader distribution of service, and reduction in air pollution and traffic congestion. The additional buses in the region will increase rider capacity by increasing the capacity of the public transit system. Similarly, the inclusion of additional buses will

[38] NJ Spotlight. (2015). Jersey Shore Homeowners cry foul over new fees added to insurance premiums. http://www.njspotlight.com/stories/15/04/02/shore-homeowners-cry-foul-over-new-fees-added-to-insurance-premiums/

result in increased transit frequency, especially during peak hours, and decreased commute times for users. It will also allow the transit system to accommodate many more round-trip commuters per day. Along with increased frequency of services comes increased distribution of service. The additional transit capacity will allow the transit system to expand to accommodate a wider service area and begin adding bus stops in previously un-served areas.

The benefits of the bus transit system that increase capacity and decrease commute times will also positively impact both congestion and air pollution in the service areas. By decreasing the number of vehicles on the roadways as the option of riding public transit becomes available in previously un-served areas and the capacity increases in heavily utilized areas, congestion will decrease. As vehicle use and congestion are leading causes of air pollution, the surrounding community will benefit from a reduction in both.

Finally, NJ TRANSIT has entered into an agreement with American Dream to significantly expand service in the region on three local bus routes.[39] Not only will this provide access for employees but also for tourists looking to visit the new mall. This agreement will extend the benefits throughout the pilot area and East Rutherford.

Combined-Sewer Overflows: During Superstorm Sandy, the Bergen County Utilities Authority (BCUA) was inundated by the 8.5 foot storm surge resulting in the shutdown of sewage treatment operations. This shutdown led to the release of hundreds of thousands of gallons of untreated sewage into the Hackensack River. Sewage releases put the community and wildlife populations at risk for exposure to disease and contamination. The release of untreated sewage increases the toxicity of floodwaters which is harmful during the storm itself, but as the floodwaters retreat, high levels of

[39] NJ Transit (2014). NJ Transit bus fleet strategy 2014-2020. Available at: http://www.njtransit.com/AdminTemp/njt_bus_fleet2014.pdf

pollutants in bodies of water and waterways remain. These toxins can lead to fish and animal deaths as the contaminated habitats cannot support life.

Additionally, the pathogens released into the water supply can have lingering health impacts on the surrounding community. Viruses, bacteria, and parasites are released by wastewater overflows. Consumption of contaminated water, or recreational use of contaminated waterways can result in a variety of illnesses. As such, beach closures are common after sewer overflows as a preventive measure. Furthermore, bottled water is often brought in to replace other forms of water when tap water deemed unsafe. This imposes an incredible cost on municipal authorities as they scramble to provide basic services in the aftermath of a storm or flood responsible for a sewer overflow.

In 2008, the EPA estimated the cost of reducing New Jersey's risk for combined sewer overflows at $9.3 billion.[40] While the covered project is not a replacement for an aging system, the construction of the berm will prevent floodwaters from inundating sewage plants, allowing planners can focus on controlling additional rain water and runoff volume.

Summary of Economic Analysis

Table 5 summarizes the results of the impacts included the BCR calculation.

Table 5. Summary of Covered Project Costs and Benefits[41]

Impacts	Average Annual Impact (Millions)	50 year Total Discounted Impact (Millions)	
		7 %	3 %

[40] Chelser, C. (2014). Down the drain: NJ's Sewage System. Available online at: http://njmonthly.com/articles/jersey-living/down-the-drain-njs-sewage-system/

[41] Note: Construction costs are realized in the first two years and although an annual equivalent is shown in the second column, the construction costs are not discounted over 50 years.

Costs			
Berm Construction Cost	$3.46	$167.53	$170.67
Annual Berm Maintenance	$0.52	$7.67	$13.77
Bus Transit Construction Cost	$1.50	$72.55	$73.91
Bus Transit Maintenance Cost	$0.90	$13.29	$23.85
Recreation Zone Construction Cost	$0.54	$26.33	$26.83
Admin. and Contingency Costs	$2.64	$127.60	$129.99
Land Acquisition Cost	$0.50	$24.18	$24.64
Wetland Construction Cost	$0.58	$28.15	$28.68
Benefits			
Avoided Residential and Commercial Damages	$63.87	$643.14	$1,429.90
Avoided Casualties	$0.18	$1.83	$4.04
Avoided Utility Damages	$0.86	$7.72	$18.35
Avoided Municipal Damages	$0.0006	$0.01	$0.01
Avoided Teterboro Airport Damages	$0.67	$6.78	$14.99
Avoided MetLife Stadium Damages	$0.02	$0.22	$0.50
Avoided American Dream Mall Damages	$2.45	$32.72	$62.56
Wetland Ecosystem Service Value	$0.76	$9.78	$18.69
Recreational and Health Benefits	$7.12	$95.19	$181.96
Avoided Debris Removal Costs	$0.12	$1.21	$2.69
Costs	**$10.65**	**$467.30**	**$492.33**

Benefits	**$76.05**	**$798.60**	**$1,733.70**
Net Present Value (NPV) [Benefits - Costs]	**$65.40**	**$331.30**	**$1,241.37**
Benefit-Cost Ratio (BCR) [Benefits / Costs]		**1.71**	**3.52**

Note: Totals may not sum due to rounding.

Over the 50 year time horizon, the largest cost of the covered project is the construction cost of the berm at $3.46 million per year. The next largest cost is the administration and contingency costs for the construction of the berm at $2.64 million per year, followed by the bus transit construction cost ($1.50 million per year), bus transit maintenance ($0.90 million per year), wetland construction ($0.58 million per year), recreation zone construction ($0.54 million per year), annual berm maintenance ($0.52 million per year), and land acquisition ($0.50 million per year).

The largest benefit of the covered project is avoided residential and commercial damages at $63.87 million per year. The next largest benefit is recreational and health benefits at $7.12 million per year, followed by avoided American Dream Mall damages ($2.45 million per year), avoided utility damages ($0.86 million per year), and wetland ecosystem services ($0.78 million per year).

Per Appendix H, Table 6 summarizes the costs and benefits by category.

Table 6: Costs and Benefits by Category

1	2	3	4	5	6
Costs and Benefits by category	**Page # in Factor Narratives or BCA**	**Qualitative Description of Effect and Rationale for**	**Quantitative assessment (Explain basis and/or**	**Monetized effect (if applicable)**	**Uncertainty**

	Attachment	Including in BCA	methodology for calculating Monetized Effect, including data sources, if applicable)		
Life cycle costs					
Berm Construction Cost		Cost to construct the berm	Monetized impact is based off of DEP project manager cost estimate	$173.2 million ($3.46 million per year)	1
Bus Transit Construction Cost		Cost to construct the bus garage	Monetized impact is based off of construction estimate from NJ TRANSIT.	$75.0 million ($1.5 million per year)	1
Recreation Zone Construction Cost		Cost to construct bike path and parks along the length of the berm	Monetized impact is based off of DEP project manager cost estimate	$27.2 million ($0.54 million per year)	1
Admin. and		Cost of	Monetized impact	$131.9	1

Contingency Costs		administration oversight of the construction of the berm and contingency costs to address cost estimate uncertainty	is based off of DEP project manager cost estimate	million ($2.64 million per year)	
Land Acquisition Cost		Cost to acquire the land that the berm will be built upon	Monetized impact is based off of DEP project manager cost estimate	$25.0 million ($0.50 million per year)	2
Berm Operation and Maintenance Cost		Annual upkeep cost of the berm	Monetized impact is based off of O&M cost equaling 15% of construction cost over 50 years	$26.0 million ($0.5 million per year)	1
Bus Transit Operation and		Annual upkeep cost of	Monetized impact is based off of	$45.0 million	1

Maintenance Cost		the bus transit garage and route	operation and maintenance costs from NJ TRANSIT	($0.90 million per year)	
Wetland Mitigation Cost		Cost to build new wetland areas that have been destroyed by the construction of the berm.	Monetized Effect is based off of DEP project manager cost estimate for construction of new wetlands and improvement cost	$29.1 million ($0.58 million per year)	1
Resiliency Value					
Avoided Residential and Commercial Damages		Commercial and residential structure damages, commercial revenue loss, and residential displacement prevented by	Monetized impact is based on damages for 100- and 500-year flood from MIT-Rebuild by Design study for pilot area. Pilot area is then scaled to estimate East Rutherford	$643.1 million ($63.9 million per year)	1

		covered project			
Avoided Casualties		Fatalities prevented by covered project	Monetized impact is based off of value of a statistical life from the Federal Aviation Administration as well as the fatalities related to flooding in Bergen County during Superstorm Sandy	$1.83 million ($0.18 million per year)	3
Reduced Vulnerability of Energy and Water Infrastructure		Damages to utilities (electricity, water supply and waste treatment) prevented by covered project	Monetized impact based off of FEMA BCA toolkit and population estimates from the US Census	$7.7 million ($0.86 million per year)	2
Avoided Municipal Loss		Prevented fire and police	Monetized impact based off of	$0.01 million	2

of Function		service interruption	services at risk of flooding determined by examining Google Maps and FEMA FIRM maps, the FEMA BCA toolkit, and municipal budgets	($0.0006 million per year)	
Avoided Teterboro Airport Lost Revenue		Avoided lost revenue from airport closures	Monetized impact based off of annual revenue from the NY and NJ Port Authority and the FEMA BCA toolkit	$6.8 million ($0.67 million per year)	1
Avoided MetLife Stadium Lost Revenue		Avoided lost revenue from stadium closures	Monetized impact based off of annual revenue from the MetLife Stadium website and the FEMA BCA toolkit	$0.22 million ($0.02 per year)	2
Avoided American Dream		Expected avoided lost revenue from	Monetized impact based off of expected lost	$32.7 million ($2.4	2

Meadowlands Mall Lost Revenue		mall closures	commercial revenue based off of lost commercial revenue estimated for the pilot area and the estimated size of the mall.	million per year)	
Environmental Value					
Wetland Ecosystem Services		Value of wetland services including: air quality regulation, climate regulation, water quality and waste treatment services, and habitat and biodiversity services.	Monetized impact based off of the value of ecosystem services from the New Jersey Department of Environmental Protection (2004).	$9.78 million ($0.76 million per year)	1
Community Development Value					

Avoided Casualties (Human Suffering)		Fatalities prevented by covered project (only included once to avoid double counting with Resiliency Value)	Monetized impact based off of value of a statistical life from the Federal Aviation Administration as well as the fatalities related to flooding in Bergen County during Superstorm Sandy.	$1.83 million ($0.18 million per year)	3
Avoided Mental/ Emotional Stress		Avoided mental stress and PTSD symptoms resultant from flooding damages	Quantified impact based off on historical estimates for percent of residents with homes damaged by Superstorm Sandy presenting signs of ongoing stress and PTSD and the cost to treat based on HUD guidance	$9.5 million per year	3
Health		Health and	Monetized impact	$95.2	2

and Recreation Benefits		recreation value of parks to visitors	based on the user heath and visitor recreational benefit from the Trust for Public Land	million ($7.1 million per year)	
Housing Affordability		Changes in housing affordability due to reduced flood risk and lower insurance premiums	Impact based on the net effect of increasing housing prices resulting from increased demand for hosing due to reduced flood risk as well as increased disposable income from reduced flood insurance premiums	Not Applicable	5
Economic Revitalization					
Tourism		Damages to the tourism industry prevented by covered project	Quantified impact based on damages to tourism for Bergen County suffered during Superstorm Sandy	$122 million per year	4

Property Values		Increases in property value resulting from covered project	Quantified impact based on increase in property values as a result of reduced flood damages and recreation zones	$546.3 million	3
Tax Revenues		Increases in tax revenue as a result of increasing property values	Quantified impact based on the increase in property values resulting from increasing tax revenues as well as local property tax rates	$17.6 million per year	3
Insurance Premiums		Decreases in insurance premiums as a result of the reduced flood risk due to the covered project	Impact based on estimated insurance premium rate increase post Superstorm Sandy	Not Applicable	3

[a] Per HUD guidance an uncertainty rating between 1 (most certain) and 5 (least certain) is used. Estimates obtained using the FEMA BCA toolkit or particular to the study area are assigned a value of

1 or 2. Bergen County estimates, either from Superstorm Sandy or elsewhere, scaled down to the study area are given a value of 3. An uncertainty value of 4 or 5 is assigned to a category if the estimate is derived from a total for New Jersey or a similar larger geographic area.

7. Risks to Ongoing Benefits

7.1 Dealing with Risks and Uncertainties

There are several factors in the analysis of the covered project that are uncertain. The risk of this uncertainty pertains to the under- or over-estimation of the costs and benefits of the construction of the berm. While this uncertainty should be considered, DEP is confident that the analysis methods and the values used result in reasonable estimates for the costs and benefits of the covered project.

Scaling Approach: The analysis of the costs and benefits of the covered project uses location specific data where possible. The expected damages from a 100- and 500-year flood in the pilot area are generally based on a GIS analysis and are assumed to be accurate. It was not possible to use the same methodology to determine the expected damages in East Rutherford. Therefore, the pilot area to East Rutherford was scaled to estimate the residential and commercial values needed. While the scaling approach used provides an accurate approximation, it should be understood that there is uncertainty in using such approximations. This uncertainty is seen particularly in the loss of function estimates calculated for lost commercial revenue existing retail businesses as well as the American Dream Mall.

Easements: As discussed previously, it is assumed that easements necessary for the construction of the berm are voluntary. Based on DEP's experience with USACE beach and dune restoration projects, DEP is confident that the overwhelming majority of necessary easements will be provided voluntarily. If there are landowners that resist voluntarily providing or selling easements, there are a number of alternatives available that may include realigning the berm and associated public access and ecological restorations or other government measures to ensure access to the properties.

Avoided Casualties and Human Suffering: The avoided casualties and human suffering that are expected benefits of the berm are somewhat uncertain. These benefits are based on the number of fatalities from Hurricane Sandy due to flooding. While these estimates are expected to be accurate and are the only recent and location specific values available, they represent only one storm. It is possible that the casualties could either be under- or over-estimated because of the small sample size.

Climate Change: While the DEP used FEMA flood elevation data, as the best available models and other predictions to anticipate future 100 and 500 year floods levels, significant uncertainties exist in predicting the size, frequency and duration of future flood events. The proposal incorporates a modeled margin of safety to anticipate potential higher flood levels. However, those models are based primarily on historical data that may not reflect future events, positive or negative. At the present time, FEMA flood elevation maps for New Jersey do not incorporate climate change induced sea level rise. For this reason, the proposed berm is 14 feet high. Compared to the 100 and 500 year flood levels of 9 feet and 11 feet, respectively, approximately 2 feet of berm height provides a reasonable margin of safety.

7.2 Adapting the Proposal

There are various ways to adapt the different components of the proposal. With respect to the berm, the size of the berm and the breadth of protection it affords across the Meadowlands Region is subject to the results of the feasibility study. Overall, the entire Meadowlands District encompasses approximately 36 square miles and covers 14 municipalities in two counties, as well as other estuarine and riverine communities statewide. So the projects can be adapted subject to feasibility. The feasibility phase will need to evaluate (a) protecting a reduced area, (b) utilizing different construction techniques, (c) implementing only rain event stormwater infrastructure projects, (d) minimizing desirable features such as public access to the Hackensack River waterfront that could have been associated with the coastal surge and fluvial flood resistant structures, and (e) reducing or eliminating

the public mass transit component of the project. A guiding principle for scaling would be ensuring protection against a 500 year flood event. Wetlands improvements, ecological enhancements and recreational opportunities also could be adapted and customized. Innovative flood management construction designs and procedures can be used to address some of the key risks of the project area. Construction designs also will invariably be dependent on existing and projected land/water elevations which will factor significantly into the scope of the project.

The NJ TRANSIT 90-bus satellite bus garage cannot be scaled down. That is the minimum size for a satellite bus garage that can service the size and number of buses needed to enhance transportation resilience in the target communities. Depending on design assessments, scaled up alternatives could include a 110-bus satellite bus garage as well as a full 300-bus bus garage, the latter of which is estimated to cost approximately $300 million and would require significant, at present unidentified non-NDR funds to complete.

8. Challenges with Implementation

Landowner Resistance: Although much of the land for the proposed flood control and revitalization efforts is under public management, landowners may resist sale of easements identified by the State as necessary to ensure maximum effectiveness of the proposed approach. The proposed budget includes funds for land purchase; however individuals may refuse purchase offers. Refusals could increase costs due to realignment of the berm and associated public access and ecological restorations or other government measures to ensure access to the properties.

Technical Risks: The New Meadowlands RBD Proposal was developed by multi-disciplinary teams made up of architects, designers, planners and engineers were engaged by HUD and charged with proposing regional and community-based projects that would promote resilience in various Sandy-affected areas. The teams included experts and thought-leaders from around the world. The

expanded Meadowlands project area is founded upon these concepts. The project will address unmet needs, and create more resiliencies by the placement of these berms in addition to wetlands enhancements. The feasibility and design that will be part of this project will conform to accepted design practices, established codes, standards, modeling techniques, and best practices. It is important to recognize that this NDR Phase 2 project is far more than mere completion/expansion of the RBD flood protection berm. It is broader in scope than RBD, targeting an entire region as opposed to just five communities. It reflects smart planning and building, by accounting for sea level rise and other risks, through NOAA's Sea Level Rise Tool and by incorporating Sea, Lake, Overland Surges from Hurricanes (SLOSH) modeling and overlaying this data onto current FEMA maps. The conceptual project goal is protection against a 500 year flood event. Thus the project is forecast to last for the foreseeable future. Development of this proposal (like RBD) also sought to account for the needs and challenges faced by LMI and vulnerable populations. And through the toolkit, and targeting the region because of its similarities to other estuarine and riverine areas, is replicable.

Additionally the feasibility study for the proposed project expressly must assess potential impacts, if any, that the implementation of flood risk reduction measures would have on upstream and downstream communities.

Broad Community Support: The NDR team includes a consortium of state agencies and authorities, including, the following: the Department of Community Affairs (DCA) DEP, the NJMRC, NJ TRANSIT, the Department of Human Services (DHS), and Rutgers University. In addition to these partners, the State has conducted extensive outreach to gain community support. DEP representatives contacted over 150 local organizations to solicit their input in the design of the application. Flyers describing the projects were widely distributed in low income communities. A community meeting was held where citizens participated in breakout sessions to discuss the project, ask questions and raise concerns. Outreach included utilizing services from two New Jersey-based organizations that specialize

in outreach to vulnerable populations. Twelve environmental groups were contacted and representatives from nine groups attended a boat tour hosted by DEP and NJMRC. This boat tour along the Hackensack River provided a visual tour of proposed project area; allowing environmental groups to understand the extent and scope of the project. Once project planning begins, a NDR project Citizens Advisory Committee will be formed. This group is made up of citizens representing the various populations that will potentially be impacted by the projects. It will have representatives of vulnerable populations, senior citizens, low income residents and persons with disabilities. The DHS and the organizations, with which it regularly works in Bergen County, will be included in the stakeholder group and will assist DEP and NJ TRANSIT to identify organizations serving the local vulnerable populations as well as representatives of these groups for inclusion on the Citizens' Advisory Committee. The Citizens' Advisory Committee will also have representatives from each of the project teams and will have one or two representatives identified to serve on the NDR Project Working Group. This will ensure that the interests and concerns of vulnerable populations are represented throughout design and implementation and that their input becomes part of the decision making process.